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Analysis of RFR Biological Effects

Technical Note

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Introduction

The avoidance of harmful effects, especially long term effects (cancers, mutations, reproductive disorders, etc.) is one of the dominant concerns for nonlethal weapons generally, and RFR technologies specifically. The need for the participation of policy, legal, and medical organizations at all stages of the research means that familiarity with the scientific basis for the potential occurrence of these effects is critical. All of these organizations recognize that the first step in this assessment is a review of the literature.

In order to provide some guidance in this area, a summary of existing, reviewed literature was made. Several comprehensive reviews of the RFR biological effects research have been conducted in the past two years and these reviews provided the basis for this analysis. Our objective is not to make a scholarly assessment of the research, but to analyze trends in the data, as reported.

The approach taken is as follows. Each citation summarized in References 1, 2, and 3 were entered into an MS Access database. Since many of the citations are duplicated between these reviews, each citation in Reference 2 and 3 was cross-checked for uniqueness before entering. Approximately 300 unique citations were found.

For each citation a number of data points were determine; a data point is an exposure condition (frequency, type of modulation, intensity, and duration), species, and biological effect observed. When a range of values was reported, the high and low extremes were entered. When the citations were quoted in more than one reference, the data reported was cross-checked. If the data was in disagreement between the summaries, the original paper was consulted to resolve the difference. This process produced over 700 data points.

To make the characterization of the data reported more ameniable to trend analyses, each non-numeric database field was assigned a category. The categories are as follows.

Species Type

1. Molecules
2. Cells
3. Organs
4. Embryos
5. Insects
6. Small animals
7. Large animal

Wave Modulation Type

1. Amplitude modulated (AM)
2. Continuous modulation (CM)
3. Pulse modulation (PM)
4. Sine modulation (SM)
5. Frequency modulated (FM)

Biological Effect Category

1. Behavior
2. Biochemical
3. Cardiac
4. Genetic
5. Growth
6. Health
7. Hematoligic
8. Immunologic
9. Life span
10. Metabolic
11. Molecular
12. Nervous system
13. Neuroendocrine
14. Senses
15. Teratogenesis
16. Testes

Effect Level

0. None
1. Minor
2. Severe
3. Long term

Examples of Long Term Effects Include

1. decreased postnatal survival
2. teratogenesis
3. maternal lethality, decreased fetal weight
4. increased lethality to endotoxin
5. higher mutagencity index
6. lethality

Analyses were made using JAYCOR's SCATT program for finding graphical trends in categorized data. The program is provided as part of the project deliverables along with the MS Access database.

The figures show plots made of the observed effect level vs. species and SAR for small animals and large animals. Of particular interest is the occurrence of long term effects. In each figure, the species are distributed along the horizontal axis with the legend explaining the species number. The SAR values are plotted in the vertical. For each species there are four vertical scattering of data points, one for each effect level, slightly displaced in the horizontal so the individual data can be seen. The conditions associated with long term effects are plotted as filled symbols.

As can be seen, most of the data has been taken in rodent species: rats and mice. All data with SAR > 50 W/kg show some effect. The range of SAR values for a given level is broad and overlaps other levels—in other words, there are no clear threshold of effects based on this mass of data. Such trends may be revealed if the data were further analyzed by effect category, that is, if trends were looked for in only the behavior data. Such analyses can be conducted by the user with SCATT.

Our interest here is in the occurrence of long term effects. For the rabbit and rat, the first observation of long term effects occurs for a SAR ≈ 30 W/kg, which suggests a threshold. The amount of data is too sparse for such a value to have statistical significance. For the mouse, however, long term effects (higher mutagencity index) are seen at very small values (0.5 W/kg). The lower threshold in a lower body weight animal species may be a trend.

The second figure presents the same format of data, but for larger animal species. The first observation is that the number of data points is much smaller—not unexpected given the animal's size, lifetime, and metabolic rate which make such experiments more difficult. Even though the SAR values are as large as 60 W/kg, no effects above minor, let alone long term, are observed! Again, although the number of data points is so few that statistical significance is low, the implication is intriguing.

While the analysis of these data should be pursued at greater depth (the database will point the reader to the appropriate citations where more information can be obtained), a hypothesis immediately comes to mind. The animal that shows the most significant long term effects below a SAR of 30 W/kg is the mouse, which has the smallest body mass by far. **Therefore, the possibility exists that the SAR is not the correct scaling law between species.** If this hypothesis were confirmed, then the interpretation of existing data might yield a much higher threshold for long term effects and thereby reduce the implied hazard of RFR devices.

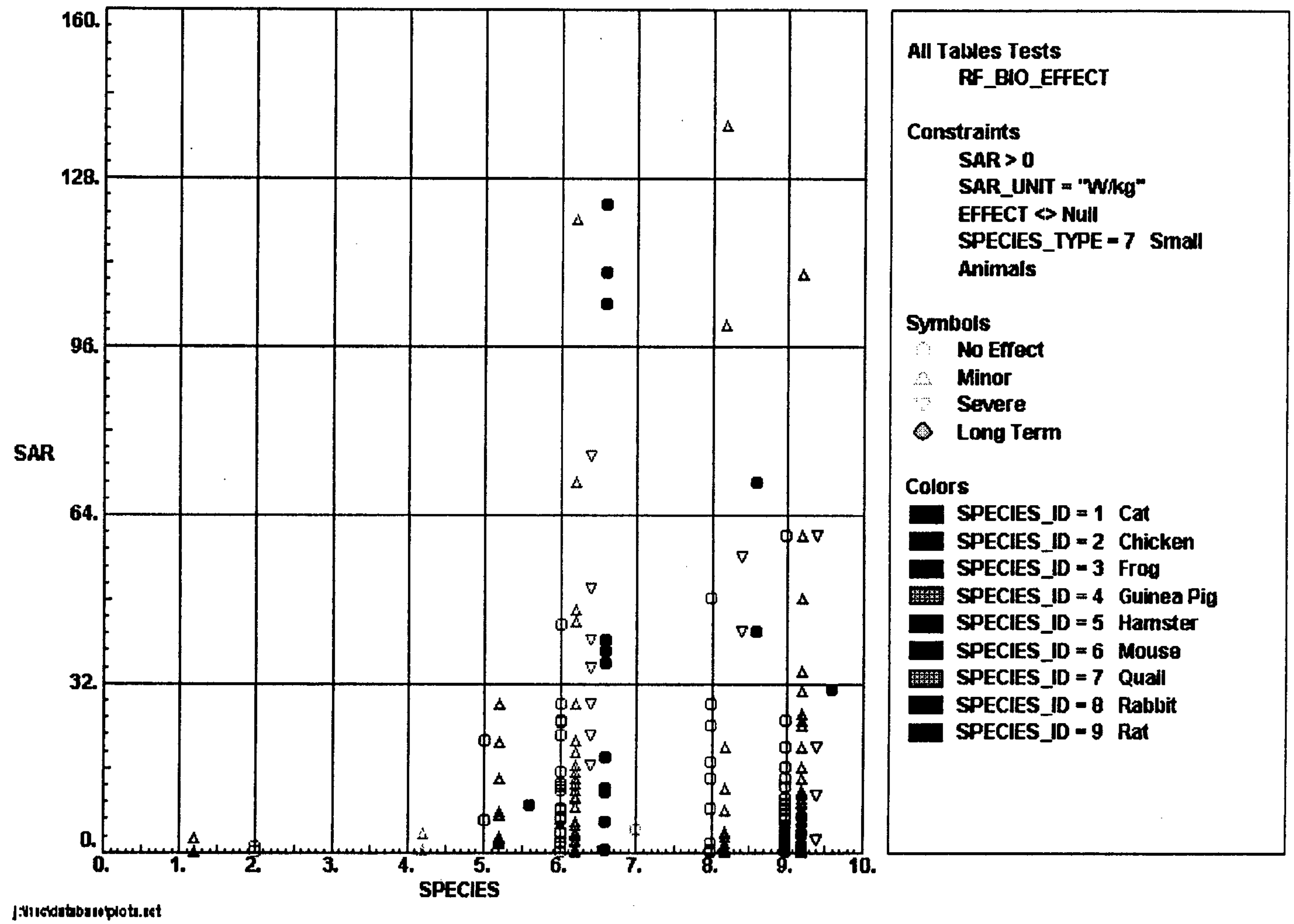

Figure 1. Small animal effects.

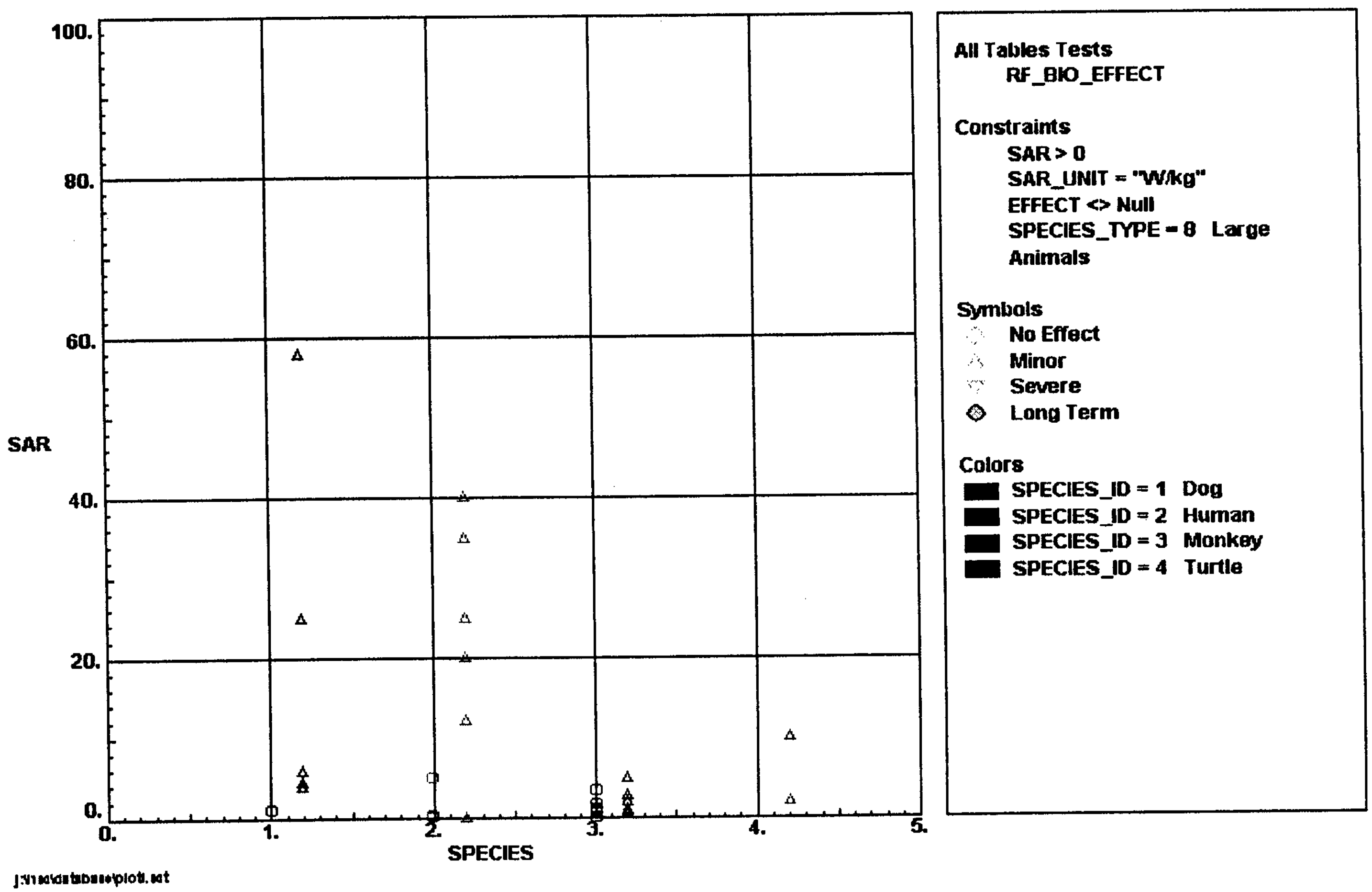

Figure 2. Large animal effects

Conclusions

The brief analysis of the RFR literature raised a question about the validity of SAR as a means of scaling data between species, especially from the very small mass species. Since many of the research items listed above are expressed in terms of effective dose, like SAR, resolving this matter is at the heart of the credibility of the results for any particular system.

References

1. Handbook of Biological Effects of Electromagnetic Fields. 2nd Edition. C. Polk and E. Postow. CRC Press (1996).

2. Radiofrequency Radiation and Teratogenesis: A Comprehensive Review of the Literature Pertinent to Air Force Operations. L. Heynick and P.Polson AUSA for AFMC Brooks AFB (1996).

3. Biological Effects of Radiofrequency Radiation. D. Cahill and J. Elder. EPA (1984).

Appendix 1:
Analysis of RFR Biological Effects

(Presentation format)

Bioeffects Review

2997-04/6-97

- **Issues**
  - Avoidance of all harmful effects
  - Participation of policy, legal, medical, etc. at each stage of research
  - Decision makers unfamiliar with scientific results
- **Objective**
  - Summarize existing, reviewed literature
  - Present trends of effects of concern
- **Approach**
  - Analysis limited to RFR and microwaves
  - Literature summaries placed in ACCESS database
  - Parameters and effects divided into categories
  - Cross trends sought with JAYCOR's SCATT program

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RFR Bioeffect Database

2997-04/6-97

- **700+ data points from the following reviews**
  - Handbook of Biological Effects of Electromagnetic Fields, 2nd Edition. C. Polk and E. Postow. CRC Press. (1996)
  - Radiofrequency Radiation and Teratogenesis: A Comprehensive Review of the Literature Pertinent to Air Force Operations. L. Heynick and P. Polson. AUSA for AFMC Brooks AFB (1996)
  - Biological Effects of Radiofrequency Radiation. D. Cahill and J. Elder. EPA. (1984).
- **Data fields**
  - Species
  - Frequency, type, intensity, duration
  - Effect description
  - Citation

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RFR Data Categories

2997-04/6-97

- **Target Type**
  - 1 = Molecules; 2 = Cells; 3 = Organs; 5 = Embryos; 6 = Insects; 7 = Small animals; 8 = Large animals
- **Wave Modulation Type**
  - 1 = Amplitude modulated (AM); 2 = Continuous modulation (CM)
  - 3 = Pulse modulated (PM); 4 = Sine modulation (SM);
  - 5 = Frequency modulated (FM)
- **Effect Category**
  - 1 = Behavior; 2 = Biochemical; 3 = Cardiac; 4 = Genetic; 5 = Growth
  - 6 = Health; 7 = Hematologic; 8 = Immunologic; 9 = Life Span;
  - 10 = Metabolic; 11 = Molecular; 12 = Nervous System;
  - 13 = Neuroendocrine; 14 = Senses; 15 = Teratogenesis; 16 = Testes
- **Effect Level**
  - 0 = No effect; 1 = Minor effect; 2 = Severe Effect; 3 = Long Term Effect

HUMAN SYSTEMS CENTER

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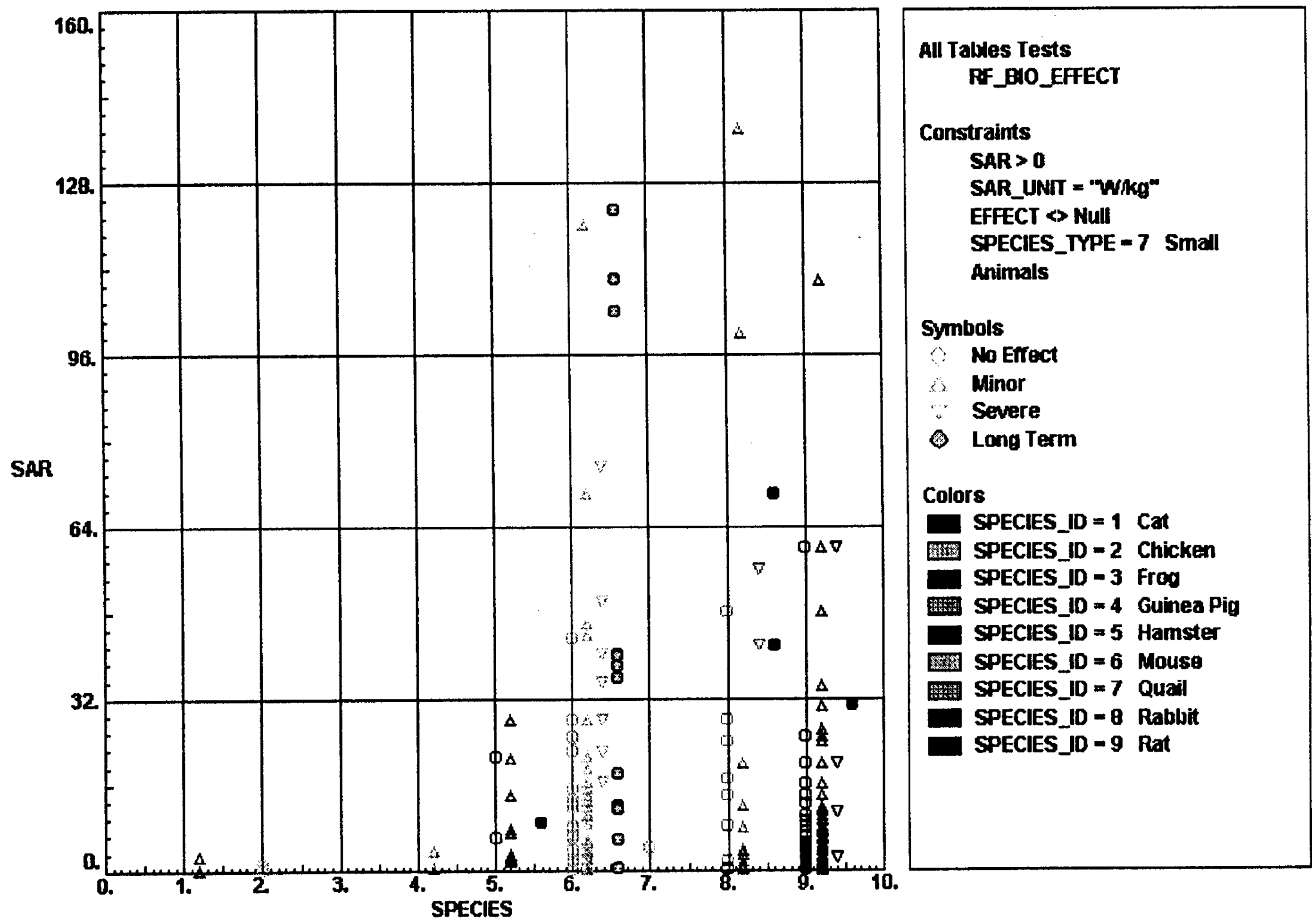
Small Animal Effects

2997-04/6-97



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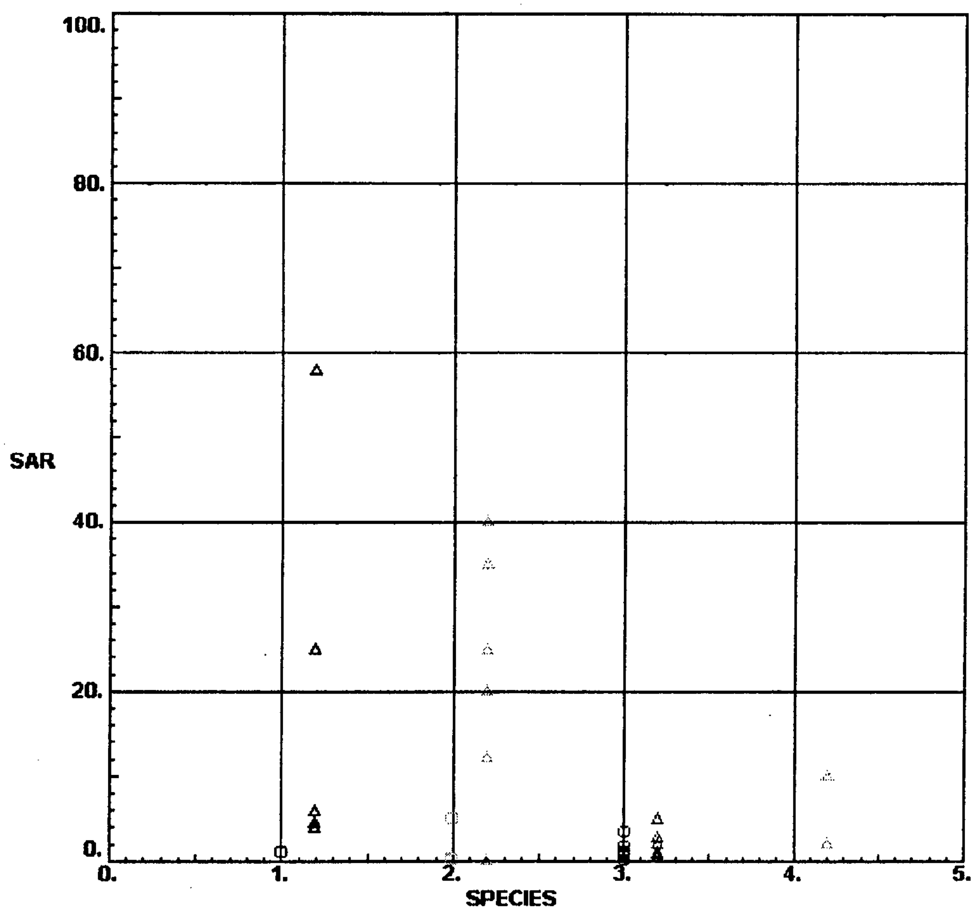
Large Animal Effects

2997-04/6-97



All Tables Tests
RF_BIO_EFFECT

Constraints
SAR > 0
SAR_UNIT = "W/kg"
EFFECT <> Null
SPECIES_TYPE = 8 Large Animals

Symbols
No Effect
Minor
Severe
Long Term

Colors
SPECIES_ID = 1 Dog
SPECIES_ID = 2 Human
SPECIES_ID = 3 Monkey
SPECIES_ID = 4 Turtle

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Summary of Bioeffects

2997-04/6-97

- **Occurrence of long term effects are a concern of NLT**
  - A potential show stopper for any NLT
  - Particular concern for EMF devices
  - Requires considerable time and effort to resolve
- **Results for the limited literature reviewed**
  - The smallest animals show long term effects at very low SAR
  - Rabbits and rats may have a threshold SAR $\approx$ 30 W/kg
  - Large animal tests have revealed no long term effects
- **Research is needed to determine**
  - If small animal models are inappropriate
  - If enough large animal tests have been conducted

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Appendix 2:
Database of Radiofrequency Biological Effects

Database of Radiofrequency Biological Effects

2997

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DEFINITION OF FIELDS

DEFINITION OF FIELDS

SPECIES	Species or experimental system
SPECIES_TYPE	Species categories: 1 = Molecules, 2 = Cells, 3 = Organ, 5 = Embryo, 6 = insect, 7 = Small Animals, 8 = Large Animals
FREQUENCY	Frequency electromagnetic waves in GHz
TYPE	Wave modulation: 1 = Amplitude Modulation (AM); 2 = Continue Modulation (CM); 3 = Pulse Modulation (PM); 4 = Sine-Wave Modulation (SM); 5 = Frequency Modulation (FM)
INTENSITY	Intensity of electromagnetic waves
INTENSITY_UNIT	Units of intensity (W/m/m, kVpp/m, Vnm/m, V/m, W, or Vrms/m)
SAR	Specific Absorption Rate
SAR_UNIT	Units of SAR (W/kg, W/m/m, W/l, or J/min)
DAYS	Number of days exposed to electromagnetic waves
MINUTES	Number of minutes of each day exposed to electromagnetic waves
EFFECT	0 = Not Effects, 1 = Minor Effects, 2 = Severe Effects, 3 = Long Term Effects
EFFECT_DESCRIPTION	Description of effects
REFERENCE_INDEX	Reference index
CATEGORY	Categories of studies: 1 = Behavior, 2 = Biochemical, 3 = Cardiac, 4 = Genetic, 5 = Growth, 6 = Health, 7 = Hematologic, 8 = Immunologic, 9 = Life Span, 10 = Metabolism, 11 = Molecular, 12 = Nervous, 13 = Neuroendocrine, 14 = Senses, 15 = Teratogenesis, 16 = Testes

DATA BASE

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
1	rat (young male)	2.45	3			6.3	W/kg	1	30	decreased exploratory activity and swimming speed, temperature increase 2.5 degree C	1	1332
2	rat (male, 160-180)	10.7	2	7.5	W/m/m	0.2	W/kg	7.7	1440	no effect on spontaneous activity or forced running	1	1342
3	rat (male, 160-180)	3	2	7.5	W/m/m	0.3	W/kg	7.7	1440	no effect on spontaneous activity or forced running	1	1342
4	rat (male, 160-180)	3	3	17.5	W/m/m	0.6	W/kg	7.7	1440	no effect on spontaneous activity or forced running	1	1342
5	rat (male, 160-180)	3	3	250	W/m/m	8.3	W/kg	7.7	1440	no effect on spontaneous activity or forced running	1	1342
6	rat (female, 307)	2.45	2	100	W/m/m	2.3	W/kg	110	300	increased locomotor activity	1	1560
7	rat (male, 360-410)	0.918	2	100	W/m/m	3.6	W/kg	21	600	decreased spontaneous activity and food intake	1	1561
8	rat (male, 316-388)	0.918	2	25	W/m/m	1	W/kg	91	600	no effect on spontaneous activity or food intake	1	1516
9	rat (male, 350-375)	2.45	2	50	W/m/m	1.2	W/kg	80	480	decreased activity on stabilimetric platform, no significant increase in wheel running	1	1349
10	rat (male, 350-375)	0.915	2	50	W/m/m	2.5	W/kg	80	480	increased activity on stabilimetric platform and in wheel running	1	1563
11	rat (male)	2.375	2	5	W/m/m	0.1	W/kg	30	420	decreased time on treadmil and inclined rod, decreased exploratory activity, increased then decreased shock sensitivity; decreased activity and shock sensitivity persisted 90 days after exposure	1	1564
12	rat (female)	2.45	1			420	W/kg	10	0.17	colonic temperature rise = 0.37 degree C before start of test; delta T = 1.5 degree C with microwaves	1	1565
13	rat (female)	2.45	1			220	W/kg	10	0.5	colonic temperature rise = 0.37 degree C before start of test; delta T = 1.5 degree C with microwaves	1	1565
14	rat (male, 350-380)	0.5	2	250	W/m/m	10	W/kg	1	11	response decreased during exposure on random interval schedule (lowest intensity for effect, delta T = 1.8 degree C)	1	1566
15	rat (male, 357-382)	0.6	2	100	W/m/m	7.5	W/kg	1	55	response decreased during exposure (maximum effect) on random interval schedule, delta T = 1.8 degree C	1	1327
16	monkey (male rhesus,4 kg)	2.45	1	720	W/m/m	5	W/kg	1	60	decreased observing response on vigilance task, delta T = 2.0 degree C	1	1567
17	monkey (male rhesus,4 kg)	2.45	1	160	W/m/m	1.1	W/kg	1	20	no effect on observing responses	1	1567
18	monkey (male squirrel, 850-950)	2.45	1	500	W/m/m	2.8	W/kg	1	30	decreased observing response on vigilance task	1	1568

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
19	monkey (male squirrel, 850-950)	2.45	1	500	W/m/m	0.6	W/kg	1	60	no effect on observing responses	1	1568
20	monkey (male squirrel, 850-950)	2.45	1	500	W/m/m	1.7	W/kg	1	60	no effect on observing responses	1	1568
21	rat (male, 362-400)	1.28	3	100	W/m/m	2.5	W/kg	1	40	decreased observing responses on vigilance task	1	1570
22	rat (male, 362-400)	5.62	3	260	W/m/m	4.9	W/kg	1	4	decreased observing responses on vigilance task	1	1570
23	rat (male, 290-340)	2.45	1	375	W/m/m	7.5	W/kg	1	60	response rate decreased on fixed interval schedule in rats with high base-line rates, spending time away from level	1	1325
24	rat (male, 290-340)	2.45	1	88	W/m/m	1.8	W/kg	1	60	no effect on response rate	1	1325
25	rat (male, 290-340)	2.45	1	184	W/m/m	3.7	W/kg	1	60	no effect on response rate	1	1325
26	monkey (male rhesus, 6.2-7.9 kg)	1.2	2	200	W/m/m	1.6	W/kg	1	120	no effect on visual tracking task	1	1571
27	rat (male,120 days)	2.45	2	50	W/m/m	1.4	W/kg	1	30	response rate decreased on FR and increased on DRL schedules	1	1341
28	rat (male, 120 days)	2.86	3	50	W/m/m	1.4	W/kg	1	30	response rate decreased on FR and increased on DRL schedules	1	1341
29	rat (male, 120 days)	9.6	3	50	W/m/m	1.5	W/kg	1	30	response rate decreased on FR and increased on DRL schedules	1	1341
30	rat (male, 250-300)	2.45	2	50	W/m/m			1	30	decreased length of runs and fewer reinforcers on FCN schedule	1	1572
31	rat (male, 284-439)	2.45	2	100	W/m/m	2.7	W/kg	1	900	decreased response rate on FR operant schedule	1	1329
32	rat (male, young)	2.45	3			6.5	W/kg	1	30	increased rate of missing observing responses on vigilance task	1	1332
33	rat (male, 275)	2.8	3	50	W/m/m	0.7	W/kg	1	30	decreased rate of responding on repeated acquisition task	1	1573
34	rat (female)	2.45	2	100	W/m/m	2.3	W/kg	110	300	increased response rates in extinction, decreased stimulus control, no effect on sidman avoidance	1	1560
35	rat (male, 360-410)	0.918	2	100	W/m/m	3.9	W/kg	21	600	no effect on flavor aversion test	1	1561

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
36	rat (male, 316-388)	0.918	2	25	W/m/m	1	W/kg	91	600	no effect on flavor aversion test	1	1516
37	rat (male, 409-427)	2.45	3			0.6	W/kg	1	1	microwave detected as stimulus	1	1574
38	rat (male, 409-427)	2.45	3			2.4	W/kg	1	1	microwave detected as stimulus	1	1574
39	rat (male, 300-350)	0.918	3	150	W/m/m	7.5	W/kg	1	0.5	microwave detected as stimulus	1	1575
40	rat (female)	1.2	2	2	W/m/m	0.2	W/kg	4	30	spending more time in shielded vs. unshielded compartment	1	1576
41	rat (female)	1.2	2	24	W/m/m	2.2	W/kg	3	30	spending equal time in shielded vs. unshielded compartment	1	1576
42	rat (male, 250)	1.2	3	4	W/m/m	0.4	W/kg	1	90	spending more time in shielded vs. unshielded compartment (occurred in first of seven session)	1	1552
43	rat (male)	2.8	3	95	W/m/m	2.1	W/kg	9	60	spending more time in unirradiated compartment	1	1557
44	mouse (male, 30-34)	2.45	2			28	W/kg	1	15	decrease in SAR at 24 degree C	1	1578
45	mouse (male, 30-34)	2.45	2			43.6	W/kg	1	20	decrease in SAR when ambient temperature increased from 20 to 35 degree C	1	1579
46	mouse (male, 30-34)	2.45	2			0.6	W/kg	1	20	decrease in SAR when ambient temperature increased from 20 to 35 degree C	1	1579
47	rat (male, 200-360)	2.45	2	150	W/m/m	3.3	W/kg	1	50	no preferential orientation of rats or mice in far field of plane wave	1	1580
48	mouse (male, 25-33)	2.45	2	150	W/m/m	6.2	W/kg	1	60	no preferential orientation of rats or mice in far field of plane wave	1	1580
49	mouse (male, 25-33)	2.45	2	150	W/m/m	12.3	W/kg	1	60	no preferential orientation of rats or mice in far field of plane wave	1	1580
50	rat (female, 290)	0.918	3			60	W/kg	5	2	cannot take specific action to reduce intensity of irradiation	1	1581
51	rat (male, 325-375)	2.45	3	10	W/m/m	0.2	W/kg	1	30	augmentation of increased response rates produced by chlordiazepoxide	1	1545
52	rat (male, 250-300)	2.45	3	10	W/m/m	0.2	W/kg	1	30	shift to left on dose response curve for d-amphetamine in DRL schedule	1	1283
53	rat (fmale, 250-300)	2.45	3	10	W/m/m	0.2	W/kg	4	30	shift to left on dose response curve for d-amphetamine in DRL schedule	1	1283
54	rat (male, 360-380)	3.8	3	10	W/m/m	0.2	W/kg	1	30	no effect on dose response curve for chlorpromazine or diazepam	1	1546

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
55	mouse (male, 35-44)	2.45	2			46	W/kg	1	30	chlordiazepoxide reduced response, decreased avoidance responses, and increased escape responses to microwaves	1	1361
56	rat (male, 315-365)	2.45	2	100	W/m/m	2	W/kg	1	930	response rate decreases were augmented after exposures at higher ambient temperatures	1	1582
57	rat (male, 325-450)	2.45	2	50	W/m/m	1	W/kg	1	15	reduced responding for heat lamp in a cold room	1	1363
58	monkey (squirrel, 750-1100)	2.45	2	60	W/m/m	1	W/kg	1	10	selection of a lower ambient air temperature	1	1583
59	spider	9.6	3			0.4	W/kg	1	960	no effect on web-spinning ability	1	1338
60	spider	9.6	3			4	W/kg	1	960	no effect on web-spinning ability	1	1338
61	rat	245	2	5	W/m/m	0.14	W/kg	90	630	effects shuttle box performance and schedule level pressing	1	1344
62	rat	2.45	2	25	W/m/m	0.7	W/kg	98	420	effects shuttle box performance and schedule level pressing	1	1345
63	rat	2.45	2			0.05	W/kg	90	420	no effect on several tasks, variable effect on time-related operant task	1	1346
64	rat	2.45	2	100	W/m/m	2.7	W/kg	1	420	reduced locomotor activity, reduced response to acoustic stimuli	1	1348
65	rat	1.25	3			0.84	W/kg	1	10	interference with operant behavior above colonic delta T of 2.5 degree C only	1	1350
66	rat	1.25	3			2.3	W/kg	1	10	interference with operant behavior above colonic delta T of 2.5 degree C only	1	1350
67	monkey (rhesus)			1.31	W/m/m	0.05	W/kg	1	60	no effect on behavior	1	1355
68	monkey (rhesus)			1.31	W/m/m	0.8	W/kg	1	60	no effect on behavior	1	1355
69	rat	1.3	3	108000	W/m/m	1.8	W/kg	1	10	no behavioral effect related to PW, effects only at elevated colonic temperature	1	1356
70	rat	1.3	3	108000	W/m/m	26.2	W/kg	1	10	no behavioral effect related to PW, effects only at elevated colonic temperature	1	1356
71	rat	2	3	241000	W/m/m			1	5	no effect on behavior	1	1357
72	rat	2.6	3	241000	W/m/m			1	5	no effect on behavior	1	1357
73	rat	3	3	5E+08	W/m/m	0.7	W/kg	1	26	interference with time-interval perception	1	1359
74	rat	3	3	5E+08	W/m/m	0.7	W/kg	1	26	reduction of time on treadmill	1	1358
75	rat	3	3	5E+08	W/m/m	0.07	W/kg	1	26	disruption of Y maze performance	1	1360
76	red blood cell membrane	2.45	4			10	W/kg	1	10	nochange in activity of membrane-bound enzymes measured spectrophotometrically	2	1504

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
77	mitochondrial inner membrane	2.45	4			10	W/kg	1	10	nochange in activity of membrane-bound enzymes measured spectrophotometrically	2	1504
78	endoplasmic reticulum	2.45	2			42	W/kg	1	5	nochange in activity of membrane-bound enzymes measured spectrophotometrically	2	1102
79	Mitochondria	2.45	2			17.5	W/kg	1	30	no difference in respiratory activity	2	1505
80	Mitochondria	2.45	2			87.5	W/kg	1	120	no difference in respiratory activity	2	1505
81	Mitochondria	3.1	2			41	W/kg			no difference in respiratory activity	2	1506
82	tubulin of rabbit brain	3.4	2			112	W/kg	1	15	no change in formation of microtubules	2	1507
83	tubulin of rabbit brain	3.4	2			430	W/kg	1	15	no change in formation of microtubules	2	1507
84	vagus nerve cell	3.1	3			10	W/kg	1	1440	no change in migration of proteins with axonal membrane	2	1508
85	vagus nerve cell	3.1	3			100	W/kg	1	1440	no change in migration of proteins with axonal membrane	2	1508
86	dried file of escherichia coli cells	3.2	2			20	W/kg	1	600	no change in infrared spectra of proteins and necleic acids in escherichia coli exposed before drying	2	1052
87	ray electric organ	2.45	2			4	W/kg			no change in acetlycholinesterase activity	2	1509
88	human red blood cell	2.45	2			6	W/kg			decrease in adenosine triphosphatase activity	2	1090
89	rat liver cell membrane	2.45	2			80	W/m/m	4	30	decrease in adenosine triphosphatase activity	2	1510
90	cytochrome c oxidase	2.45	1			26	W/kg			no change in cytochrome c oxidase activity	2	1511
91	c57-bl mice	3	3			0.1	W/m/m	1	300	decrease in succine dehydrogenase activity	2	1513
92	c57-bl mice	3	3			5	W/m/m	1	300	decrease in succine dehydrogenase activity	2	1513
93	rat cerebral cortex synaptic membrane	2.45	2			10	W/m/m	1	420	decrease Na'-, K'-ATPase activity	2	1117
94	rat	2.45	3	280	W/m/m	6.5	W/kg	1	30	bradycardia developes after whole-body exposure, along with hyperthermia	3	1526
95	rat	2.45	3	480	W/m/m	11.1	W/kg	1	30	bradycardia developes after whole-body exposure, along with hyperthermia	3	1526
96	rabbit	2.4	2	200	W/m/m	3	W/kg	1	60	exposure to head promotes tachycardia; exposure to back raises repiratory rate, but not heart rate	3	1587

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
97	rabbit	2.4	3	200	W/m/m	3	W/kg	1	60	exposure to head promotes tachycardia; exposure to back raises repiratory rate, but not heart rate	3	1587
98	rabbit	2.4		400	W/m/m	8	W/kg	1	20	increased respiration	3	1588
99	rabbit	2.4		1000	W/m/m	20	W/kg	1	20	increased respiration	3	1588
100	rabbit	2.4		1000	W/m/m	20	W/kg	1	20	increased heart rate from dorsal exposure of the head	3	1588
101	heart (chick, 72-hr)	2.4		740	W/m/m			1	30	alterations in EEG (shortening of QT interval increased height of T-wave, appearance of U-wave)	3	1589
102	embryo (quail)	2.45	2			0.3	W/kg	1	5	no effect on heart rate that cannot be attributed to MW heating	3	1590
103	embryo (quail)	2.45	2			30	W/kg	1	10	no effect on heart rate that cannot be attributed to MW heating	3	1590
104	embryo (quail)	2.45	3			0.3	W/kg	1	5	no effect on heart rate that cannot be attributed to MW heating	3	1590
105	embryo (quail)	2.45	3			30	W/kg	1	10	no effect on heart rate that cannot be attributed to MW heating	3	1590
106	frog	1.42	3	0.32	W/m/m	0		1	1.7E-06	pulses synchronized with each R-wave do not affect heart rate	3	1591
107	frog	1.425	3	0.006	W/m/m	0		1	1.7E-07	synchronized pulses with QRS complex cause increase in heart rate with some arrhythmias	3	1592
108	rabbit	2.45	2	800	W/m/m	12	W/kg	10	20	increased heart rate	3	1593
109	rabbit	2.45	2	50	W/m/m	0.3	W/kg	10	20	no effect on heart rate	3	1593
110	rabbit	2.45	2	50	W/m/m	0.093	W/kg	10	20	no effect on heart rate	3	1593
111	turtle	0.96	2			2	W/kg	1	60	low power levels cause bradycardia in the isolated heart	3	1594
112	turtle	0.96	2			10	W/kg	1	60	low power levels cause bradycardia in the isolated heart	3	1594
113	rat	0.96	2			1.3	W/kg	1	5	causes slight rate decrease in the isolated heart	3	1595
114	rat	0.96	2			2.1	W/kg	1	10	causes slight rate decrease in the isolated heart	3	1595
115	frog	1.42	3	0.006	W/m/m			1	3.3E-08	synchronized exposures with ECG have no effect on heart rate	3	1596
116	frog	1.42	3	0.006	W/m/m			1	1.7E-07	synchronized exposures with ECG have no effect on heart rate	3	1596
117	frog	1.42	3	0.006	W/m/m			1	2.5E-06	synchronized exposures with ECG have no effect on heart rate	3	1596
118	rat	1.25	2			9.5	W/kg			bradycardia caused by head exposure	3	1395
119	rat	1.25	2			30.4	W/kg			bradycardia caused by head exposure	3	1395
120	rat	1.25	2			34.3	W/kg			bradycardia caused by neck exposure	3	1395
121	rat	1.25	2			109.8	W/kg			bradycardia caused by neck exposure	3	1395
122	rat	1.25	3			9.5	W/kg			bradycardia caused by head exposure	3	1395
123	rat	1.25	3			30.4	W/kg			bradycardia caused by head exposure	3	1395

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
124	rat	1.25	3			34.3	W/kg			bradycardia caused by neck exposure	3	1395
125	rat	1.25	3			109.8	W/kg			bradycardia caused by neck exposure	3	1395
126	mouse	1.7	2	500	W/m/m	2.4	W/kg	1	80	change in thermal denaturation profile and hyperchromicity of DNA extracted from tests following exposure	4	1062
127	mouse	1.7	2	100	W/m/m	0.26	W/kg	1	80	change in thermal denaturation profile and hyperchromicity of DNA extracted from tests following exposure	4	1062
128	hamster (chinese)	2.45	2	250	W/m/m	21	W/kg	5	15	no chromosome aberrations in white blood cells	4	1027
129	mouse	2.45	2	200	W/m/m	15	W/kg	1	254	no sister chromatid exchange in bone marrow cells	4	1497
130	hamster (chinese)	2.45	2	2000	W/m/m	360	W/kg	1	30	no chromosome aberrations in CHO-K1 cell line if temperature maintained	4	1498
131	rat	0.013	2	4.45	kVpp/m	1.3	W/kg	1	1680	no chromosome aberrations or change in mitotic activity in regenerating liver cells	4	1499
132	rat	0.013	2	44.1	kVpp/m	1.3	W/kg	1	2640	no chromosome aberrations or change in mitotic activity in regenerating liver cells	4	1499
133	escherichia coli	2.45	2	100	W/m/m	15	W/kg	1	180	no mutation induction	4	1053
134	escherichia coli	2.45	2	500	W/m/m	70	W/kg	1	240	no mutation induction	4	1053
135	escherichia coli	1.7	2	250	kVpp/m	3	W/kg	1	120	no mutation induction	4	1053
136	sallmonella typhimurium	2.45	2	200	W/m/m	40	W/kg	1	90	no mutation induction observed in Ames tester strains	4	1054
137	sallmonella typhimurium	8.6	3	100	W/m/m	18	W/kg	1	90	no mutation induction observed in Ames tester strains	4	1054
138	sallmonella typhimurium	9.6	3	450	W/m/m	80	W/kg	1	90	no mutation induction observed in Ames tester strains	4	1054
139	escherichia coli	8.8	3	105	W/m/m	50	W/kg	1	90	reduction in survival concomitant with rise in sample temperature	4	1500
140	sallmonella typhimurium	8.8	3	450	W/m/m	80	W/kg	1	90	reduction in survival concomitant with rise in sample temperature	4	1500
141	saccharomyces cerevisiae	8.8	3	450	W/m/m	80	W/kg	1	120	reduction in survival concomitant with rise in sample temperature	4	1500
142	saccharomyces cerevisiae	71.5	2	600	W/m/m	17	W/kg	1	180	no reduction in survival or mutation events	4	1501
143	saccharomyces cerevisiae	9.4	2			28	W/kg	1	300	no reduction in survival or mutation events	4	1501
144	saccharomyces cerevisiae	17	2			28	W/kg	1	1440	no reduction in survival or mutation events	4	1501

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
145	escherichia coli	3.3	2			19	W/kg	1	480	no detectable lethal events as measurable change in CFUs	4	1052
146	escherichia coli	3.2	2			21	W/kg	1	720	no observable change in molecular structure as measurable change in infrared spectrum	4	1052
147	escherichia coli	3.2	2			16	W/kg	1	600	no observable change in molecular structure as measurable change in infrared spectrum	4	1052
148	escherichia coli	8.6	2			12	W/kg	1	390	no repairable DNA damage	4	1488
149	escherichia coli	2.45	2	0.05	W/m/m	0.008	W/kg	1	240	no change in growth pattern; enchanced colony-forming activity	4	1489
150	escherichia coli	2.45	2	500	W/m/m	75	W/kg	1	240	no change in growth pattern; enchanced colony-forming activity	4	1489
151	saccharomyces cerevisiae	2.45	2	200	W/m/m	40	W/kg	1	120	no change in mutation frequencies at either of the two loci controlling requirements for adenine and tryptophan	4	1054
152	saccharomyces cerevisiae	9.05	3	230	W/m/m	80	W/kg	1	120	no change in mutation frequencies at either of the two loci controlling requirements for adenine and tryptophan	4	1054
153	drosophila melanogaster	2.45	2			100	W/kg	1	360	no mutagenic effects in exposed embryos	4	1490
154	drosophila melanogaster	2.45	2	46000	W/m/m	150	W/kg	1	45	no change in generation time, sex ratio, or sex-linked lethal mutations in offspring	4	1049
155	drosophila melanogaster	2.45	2	65000	W/m/m	210	W/kg	1	45	no change in generation time, sex ratio, or sex-linked lethal mutations in offspring	4	1049
156	drosophila melanogaster	0.029	2	600	Vnm/m	0.024	W/kg	1	720	no mutations in adult males as evidenced by chromosome loss; nondisjunction; or sex-linked recessive lethals	4	1048
157	drosophila melanogaster	0.146	2	62.5	Vnm/m	0.015	W/kg	1	720	no mutations in adult males as evidenced by chromosome loss; nondisjunction; or sex-linked recessive lethals	4	1048
158	escherichia coli	0.027	2			4	W/kg	1	230	no change in mutation induction	4	1491
159	escherichia coli	2.45	2			35	W/kg	1	60	no change in mutation induction	4	1491
160	escherichia coli	2.45	2			100	W/kg	1	400	no change in mutation induction	4	1491
161	escherichia coli	3.07	3			35	W/kg	1	60	no change in mutation induction	4	1491
162	escherichia coli	3.07	3			100	W/kg	1	400	no change in mutation induction	4	1491
163	sallmonella typhimurium	0.027	2			4	W/kg	1	230	no change in mutation induction	4	1491
164	sallmonella typhimurium	2.45	2			35	W/kg	1	60	no change in mutation induction	4	1491
165	sallmonella typhimurium	2.45	2			100	W/kg	1	400	no change in mutation induction	4	1491
166	sallmonella typhimurium	0.027	3			35	W/kg	1	60	no change in mutation induction	4	1491

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
167	sallmonella typhimurium	0.027	3			100	W/kg	1	400	no change in mutation induction	4	1491
168	drosophila melanogaster	0.098	2	0.3	Vnm/m	0.0004	W/kg	224	1140	no mutagenic (recessive lethals) in adult femals	4	1492
169	rat	2.45	2	50	W/m/m	4.7	W/kg	106	240	no significant germ-cell mutagenesis in weekly breedings	4	1064
170	rat	2.45	2	50	W/m/m	0.9	W/kg	106	240	no significant germ-cell mutagenesis in weekly breedings	4	1064
171	rat	2.45	2	100	W/m/m	2	W/kg	5	300	no significant germ-cell mutagenesis in weekly breedings	4	1064
172	rat	2.45	2	280	W/m/m	5.6	W/kg	20	240	same, except decrease in pregnancies, indicating temporary sterility caused by elevated testicular temperatures	4	1064
173	escherichia coli	37	2	5	W/m/m			1	75	induction of repressed protein, colicin, indicating a change in the genetic processes	4	1493
174	saccharomyces cerevisiae	41.7	2	20	W/m/m			1	180	change in growth rate that was very frequency specific, indicating an alteration in the process of the cell	4	1039
175	hamster (chinese)	0.019	3	300	kVpp/m			1	30	chromosome aberration in lung cells in vitro in two frequencies but not at two closely related frquencies, 0.015 or 0.025 GHZ	4	1022
176	hamster (chinese)	0.021	3							chromosome aberration in lung cells in vitro in two frequencies but not at two closely related frquencies, 0.015 or 0.025 GHZ	4	1494
177	mouse	9.4	3	1	W/m/m	0.05	W/kg	10	60	increase in chromosome translocations in sperm cells	4	1495
178	mouse	9.4	3	100	W/m/m	5	W/kg	10	60	increase in chromosome translocations in sperm cells	4	1495
179	sallmonella typhimurium	2.45	2	51000	W/m/m			1	0.255	increased mutations and lethality	4	1496
180	mouse	2.45	2			43	W/kg	1	30	no change in dominant lethality	4	1063
181	escherichia coli	9.4	2			23	W/kg	1	30	no effect on colony survival and chromosome damage	4	1503
182	escherichia coli	73								frequency-specific inhibition of cell growth	4	1038
183	saccharomyces cerevisiae	9.4	2			23	W/kg	1	30	no effect on mutation or meiosis efficiency	4	1503
184	saccharomyces cerevisiae	70	2			28	W/kg	1	30	no effect on mutation or meiosis efficiency	4	1503
185	hamster (chinese)	2.45		1000	W/m/m			1	30	chromatid breaks, rings and exchangs	4	1026
186	rat	0.1	2	460	W/m/m	2.8	W/kg	112	240	no effect on growth, nrurological and immunological development, or mutagenicity	5	1534
187	monkey (squirrel)	2.45	2			3.4	W/kg	285	180	no change in infant mortality	5	1190
188	monkey	2.45	2			3.4	W/kg	285	180	no change in infant mortality	5	1191

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
189	mouse	2.45	2	100	W/m/m	6	W/kg	24	48	no effect on growth	5	1535
190	mouse	2.45	2	100	W/m/m	8	W/kg	24	48	no effect on growth	5	1535
191	rat (infant)	2.45	2	400	W/m/m	20	W/kg	6	5	no effect on body weight	5	1536
192	rat (infant)	2.45	2	400	W/m/m	60	W/kg	6	5	no effect on body weight	5	1536
193	mouse	0.01	2	89000	W/m/m	0.9	W/kg	1	20	no effect on growth	5	1537
194	mouse	0.01927	2	89000	W/m/m	1.8	W/kg	1	20	no effect on growth	5	1537
195	mouse	0.019	2	1310000	W/m/m	6.3	W/kg	5	40	no effect on growth	5	1537
196	mouse	0.148	2	5	W/m/m	0.013	W/kg	50	60	no effect on weight gain	5	1169
197	egg (chicken)	2.45		2000	W/m/m	70	W/kg	1	12	embryonic LD50	5	1147
198	egg (chicken)	2.45		2800	W/m/m	98	W/kg	1	7	embryonic LD50	5	1147
199	egg (chicken)	2.45		4000	W/m/m	140	W/kg	1	4	embryonic LD50	5	1147
200	egg (chicken)	2.45		2000	W/m/m	70	W/kg	1	12	embryonic LD50	5	1148
201	egg (chicken)	2.45		2800	W/m/m	98	W/kg	1	7	embryonic LD50	5	1148
202	egg (chicken)	2.45		4000	W/m/m	140	W/kg	1	4	embryonic LD50	5	1148
203	mouse	2.45				104	W/kg	1	4	decrease postnatal survival	5	1167
204	mouse	2.45				104	W/kg	1	4	decrease postnatal survival	5	1168
205	mouse (female)	2.45		1230	W/m/m	110	W/kg	1	2	sublethal total-dose range 3 - 8 cal/g; teratogenic threshold dose about 3 cal/g	15	2092
206	mouse (female)	2.45		1380	W/m/m	123	W/kg	1	5	11 cal/g total dose for lethality; teratogenesis	15	2092
207	mouse (female)	2.45		1230	W/m/m	110	W/kg	1	2	sublethal total-dose range 3 - 8 cal/g; teratogenic threshold dose about 3 cal/g	15	2093
208	mouse (female)	2.45		1380	W/m/m	123	W/kg	1	5	11 cal/g total dose for lethality; teratogenesis	15	2093
209	mouse (pregnant C3H/heJ)	2.45				38	W/kg	1	10	no change in teratogenesis; increase postnatal survival	5	1161
210	rat (pregnant)	2.45				31	W/kg	1	20	maternal lethality, resorptions, decrease fetal weight.	5	1162
211	mouse	2.45		280	W/m/m	22	W/kg	12	100	decrease fetal weight	5	1163
212	egg (japanese quail)	2.45		300	W/m/m	14	W/kg	1	1440	no change in hatchability, posthatching hemogram, body or organ weight	5	1538
213	rat	2.45				14	W/kg	1	20	no change	5	1539
214	rat	2.45		400	W/m/m	10	W/kg	1	120	no change	5	1175

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
215	mouse	2.45		34	W/m/m	2	W/kg	12	100	no change	5	1163
216	mouse	2.45		140	W/m/m	8	W/kg	12	100	no change	5	1163
217	egg (japanese quail)					4	W/kg	12	1440	teratogenesis	5	1540
218	rat (pregnant)	2.45	2	50	W/m/m	2.7	W/kg	57	240	no effect on man weight, no hematologic effects, increase in response of cultured lymphocytes to T- and B-cell mitogen.	5	1176
219	rat (female)	2.45	2	280	W/m/m	4.2	W/kg	10	100	differences between RFR and sham groups in counts of live, dead, resorbed fetuses, and terata, litter weights, and morphology were nonsignificant; no brain herias or other terata were seen.	5	1541
220	rat	0.915		100	W/m/m	1	W/kg		0	no change	5	1166
221	rat	0.915		350	W/m/m	3.5	W/kg		0	no change	5	1166
222	rat	2.45				0			0	no change	5	1180
223	rat	7				0			0	no change	5	1180
224	rat	0.918		50	W/m/m	2.5	W/kg	19	1200	no change	5	1542
225	rat (female)	2.45		100	W/m/m	2.2	W/kg	16	300	decreased body and brain weight. (source#2; the differences in mean litter size among the RFR and sham groups were nonsignificant. the differences of body and brain weights among corresponding groups were not significant except for day 3)	5	1543
226	rat	24	3	100	W/m/m	1.5	W/kg	1	180	increased: WBC, lymphs, PMN, RBC,Hct, and Hgb	7	1507
227	rat	24	3	200	W/m/m	3	W/kg	1	420	increased: WBC, lymphs, PMN, RBC,Hct, and Hgb	7	1507
228	dog	24	3	240	W/m/m	1	W/kg	400	650	no change	7	1597
229	rat	3	3	100	W/m/m	2	W/kg	216	60	no change	7	1407
230	rat	3	3	400	W/m/m	8	W/kg	20	15	decreased: RBC, WBC, and lymphs	7	1407
231	rat	3	3	1000	W/m/m	20	W/kg	6	5	increased: PMN	7	1407
232	dog	2.8	3	1000	W/m/m	4	W/kg	1	360	decreased: lymphs and eos	7	1404
233	dog	2.8	3	1650	W/m/m	6	W/kg	1	120	decreased: WBC, PMN and eos	7	1404
234	dog	1.28	3	1000	W/m/m	4.5	W/kg	1	360	decreased: WBC, lymphs and eos; increased: PMN	7	1404
235	dog	0.2	2	1650	W/m/m	25	W/kg	1	360	decreased: lymphs; increased: PMN	7	1404
236	mouse (adult)	0.8		430	W/m/m	12.9	W/kg	175	120	no change	7	1419
237	guinea pig	3	2	35	W/m/m	0.5	W/kg	120	180	increased: lymphs and mitotic index of lymphoid cells	7	1409
238	guinea pig	3	3	35	W/m/m	0.5	W/kg	120	180	increased: lymphs and mitotic index of lymphoid cells	7	1409
239	rat	2.4	2	100	W/m/m	2	W/kg	30	120	increased: RBC, Hct, and Hgb	7	1598

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
240	rat	2.4	2	50	W/m/m	1	W/kg	90	60	no change	7	1599
241	rabbit	2.45	2	100	W/m/m	1.5	W/kg	180	1380	increased: eos	7	1600
242	mouse	2.45	2	1000	W/m/m	70	W/kg	1	5	increased: WBC, and CFU; decreased: 59Fe uptake	7	1601
243	mouse	2.45	2	1000	W/m/m	70	W/kg	1	5	accelerated recovery following X-irradiation; increased erythropoiesis and myelopoiesis	7	1602
244	dog	2.8	2	1000	W/m/m	4	W/kg	1	3600	accelerated recovery from X-irradiation	7	1603
245	dog	2.8	2	1000	W/m/m	4	W/kg	1	3600	accelerated recovery from X-irradiation	7	1604
246	hamster (chinese)	2.45	2	600	W/m/m	28	W/kg	1	30	increased: PMN and RBC; decreased: lymphs; accelerated recovery from X-irradiation	7	1605
247	rat (perinatal exposure)	0.425	2	100	W/m/m	3	W/kg	47	240	increased: lymphs; decreased: PMN (not reproduced consistently)	7	1606
248	rat (perinatal exposure)	0.425	2	100	W/m/m	7	W/kg	47	240	increased: lymphs; decreased: PMN (not reproduced consistently)	7	1606
249	rat (perinatal exposure)	0.1	2	460	W/m/m	2	W/kg	57	240	no change	7	1534
250	rat (perinatal exposure)	0.1	2	460	W/m/m	3	W/kg	57	240	no change	7	1534
251	rat (young)	2.736	3	244	W/m/m	5	W/kg	35	240	decreased: Hct, WBC, and lymphs	7	1607
252	rat (young)	2.736	3	244	W/m/m	25	W/kg	35	240	decreased: Hct, WBC, and lymphs	7	1607
253	mouse	2.45	2	300	W/m/m	22	W/kg	22	30	no change	7	1421
254	mouse	0.026	2	86	W/m/m	13	W/kg			decreased: lymphs; increased: PMN	7	1422
255	human	2.45	2			103.5	W/kg	1	30	no effect on oxidative activity of mononuclear cells	7	1440
256	human	2.45	2			12.3	W/kg	5	720	increase in blast transformation, PW over CW	7	1438
257	human	2.45	3			12.3	W/kg	5	720	increase in blast transformation, PW over CW	7	1438
258	human	0.027	2			196	W/kg	1	120	increase in 3H-thymidine uptake in lymphocytes at <= 50 W/kg	7	1439
259	human	2.45	2			196	W/kg	1	120	increase in 3H-thymidine uptake in lymphocytes at <= 50 W/kg	7	1439
260	lymphocyte (human)	3	3	70	W/m/m	0		4	240	increased blastogenesis of exposed lymphocytes in vito	8	1615
261	lymphocyte (human)	3	3	140	W/m/m			4	15	increased blastogenesis of exposed lymphocytes in vito	8	1615
262	lymphocyte (human)	10		50	W/m/m					increased blastogenesis	8	1065

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
263	lymphocyte (human)	10		150	W/m/m					increased blastogenesis	8	1065
264	lymphocyte (human)	2.45	2			0.5	W/l	1	120	no effect on viability, DNA, RNA, total protein, interferon synthesis	8	1430
265	lymphocyte (human)	2.45	2			4	W/l	1	120	no effect on viability, DNA, RNA, total protein, interferon synthesis	8	1430
266	spleen cell (mouse)	2.45	2	100	W/m/m	19	W/kg	1	240	no change in mitogen response to PHA, Con A, or LPS	8	1425
267	blood lymphocyte (rat)	2.45	2	50	W/m/m	0.7	W/kg	1	240	no change in viability or growth	8	1616
268	blood lymphocyte (rat)	2.45	2	100	W/m/m	1.4	W/kg	1	1440	no change in viability or growth	8	1616
269	blood lymphocyte (rat)	2.45	2	200	W/m/m	2.8	W/kg	1	2640	no change in viability or growth	8	1616
270	human lymphoblast cell lines (Daudi and HSB2)	2.45	2	100	W/m/m	25	W/kg	1	15	no change in viability or growth	8	1617
271	human lymphoblast cell lines (Daudi and HSB2)	2.45	2	5000	W/m/m	1200	W/kg	1	15	no change in viability or growth	8	1617
272	macrophage (mouse)	2.45	2	500	W/m/m	15	J/min	1	30	decreased macrophage phagocytosis	8	1618
273	granulocyte (rabbit)	3	2	10	W/m/m		W/kg	1	15	liberation of intracellular hydrolytic enzymes and increased death	8	1619
274	granulocyte (rabbit)	3	2	50	W/m/m		W/kg	1	60	liberation of intracellular hydrolytic enzymes and increased death	8	1619
275	escherichia coli	2.45	2			0.0075	W/kg	1	240	no change in growth, CFU, or various strains of exposed cultures under several growth conditions	8	1489
276	escherichia coli	2.45	2			75	W/kg	1	240	no change in growth, CFU, or various strains of exposed cultures under several growth conditions	8	1489
277	escherichia coli	2.45	2			400	W/kg	1	1	no change in survival cures (measuring CFU) of exposed cultures	8	1620
278	B. subtilis spores	2.45	2			400	W/kg	1	1	no change in survival cures (measuring CFU) of exposed cultures	8	1620
279	escherichia coli	3.3	2			29	W/kg	1	480	no effect on colony-forming ability	8	1052

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
280	A. tumefaciens	10	2			1	W/kg	1	30	temporary decreas in virulence (>6hr) of bactreia for its host cells; recovery within 24 hr at 37 degree C	8	1621
281	human lymphocytes infected with influenza virus	2.45	2			0.29	W/l	1	120	no alteration in viability, unstimulated DNA synthesis or PHA-stimulated DNA synthesis	8	1444
282	human lymphocytes infected with influenza virus	2.45	3			4	W/l	1	120	no alteration in viability, unstimulated DNA synthesis or PHA-stimulated DNA synthesis	8	1444
283	lymphocyte (human)	2.45	3			0.29	W/l	1	120	no alteration in viability, unstimulated or PHA-stimulated DNA and protein synthesis	8	1623
284	lymphocyte (human)	2.45	3			4	W/l	1	120	no alteration in viability, unstimulated or PHA-stimulated DNA and protein synthesis	8	1623
285	lymphocyte (human)	2.45	2			12	W/l	1	120	no alteration in viability, unstimulated or PHA-stimulated DNA, RNA and total protein synthesis	8	1624
286	lymphocyte (human)	2.45	2			22.5	W/l	1	120	no alteration in viability; decreased unstimulated RNA and total protein synthesis; delayed PHA-stimulated DNA, RNA, and total protein synthesis	8	1624
287	mouse	2.95	3	5	W/m/m	0.5	W/kg	42	120	increase in lymphoblasts in lymph nodes and increased response to SRBC	8	1448
288	rabbit	2.95	3	50	W/m/m	0.8	W/kg	36	120	increase in "spontaneous" lymphoblasts transformation of cultured lymphocytes	8	1448
289	mouse	3.105	3	20	W/m/m	2	W/kg	1	8700	increase in lymphoblasts in spleen and lymphoid tissue	8	1417
290	hamster (chinese)	2.45	2	50	W/m/m	2.3	W/kg	5	15	increased transformation of unstimulated cultured lymphocytes and decreased mitosis in PHA-stimulated lymphocyte cultures	8	1027
291	hamster (chinese)	2.45	2	150	W/m/m	6.9	W/kg	5	15	increased transformation of unstimulated cultured lymphocytes and decreased mitosis in PHA-stimulated lymphocyte cultures	8	1027
292	hamster (chinese)	2.45	2	300	W/m/m	13.8	W/kg	5	15	increased transformation of unstimulated cultured lymphocytes and decreased mitosis in PHA-stimulated lymphocyte cultures	8	1027
293	hamster (chinese)	2.45	2	450	W/m/m	20.7	W/kg	5	15	increased transformation of unstimulated cultured lymphocytes and decreased mitosis in PHA-stimulated lymphocyte cultures	8	1027
294	mouse	2.45	2	50	W/m/m	3.6	W/kg	1	30	transient decrease and increased response of cultured lymphocytes to PHA, Con A, and LPS	8	1432
295	mouse	2.45	2	150	W/m/m	10	W/kg	17	30	transient decrease and increased response of cultured lymphocytes to PHA, Con A, and LPS	8	1432
296	mouse	2.45	2			14	W/kg	1	30	increase in Cr+, Fc+, and Ig+ spleen cells; increased response to B-cell mitogens; decrease in primary response to SRBC	8	1423

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
297	mouse	2.45	2			14	W/kg	1	30	increase in Cr+, Fc+, and Ig+ spleen cells; increased response to B-cell mitogens; decrease in primary response to SRBC	8	1424
298	mouse	2.45	2			14	W/kg	1	30	increase in Cr+, Fc+, and Ig+ spleen cells; increased response to B-cell mitogens; decrease in primary response to SRBC	8	1433
299	mouse	2.45	2			11.8	W/kg	1	15	increase in Cr+ and Fc+ spleen cells	8	1434
300	mouse	2.45	2			5	W/kg	1	30	increase in Cr+ and Fc+ spleen cells	8	1434
301	rat	0.425	2	100	W/m/m	3	W/kg	47	240	increase in response of cultured lymphocytes to T- and B-cell mitogen	8	1606
302	rat	0.425	2	100	W/m/m	7	W/kg	47	240	increase in response of cultured lymphocytes to T- and B-cell mitogen	8	1606
303	mouse	2.45	2	50	W/m/m	4	W/kg	22	15	no change	8	1421
304	mouse	2.45	2	350	W/m/m	25	W/kg	22	30	no change	8	1421
305	rat	0.1	2	460	W/m/m	2	W/kg	22	15	no change	8	1534
306	rat	0.1	2	460	W/m/m	3	W/kg	22	30	no change	8	1534
307	mouse	0.026	2	8000	W/m/m	5.6	W/kg	1	15	increase in T and B lymphocytes in spleen; decrease in DTH	8	1431
308	mouse	0.026	2	8000	W/m/m	5.6	W/kg	10	15	increase in T and B lymphocytes in spleen; decrease in DTH	8	1431
309	mouse	2.6	2	50	W/m/m	3.8	W/kg	1	60	reduction of lymphocyte traffic from lung to spleen	8	1435
310	mouse	2.6	2	250	W/m/m	19	W/kg	1	60	reduction of lymphocyte traffic from lung to spleen	8	1435
311	rabbit	2.45	2	100	W/m/m	1.5	W/kg	180	1380	decreased response to PWM	8	1600
312	quail	2.45	2	50	W/m/m	4.03	W/kg	12	1440	no change	8	1456
313	mouse (infant)	2.45	2			35	W/kg	13	20	decrease in tumor development	8	1095
314	rabbit	3	2	30	W/m/m	0.5	W/kg	63	360	decreased granulocytic response	8	1437
315	rabbit	1.356						1	12.5	tumor regression and increase in antitumor antibodies and anti-BSA	8	1608
316	rat	2.45	2					4.5	45	tumor inhibition and immune stimulation	8	1609
317	mouse	1.356		7500	W/m/m			1	5	increased tumoricidal activity in lymphocytes and macrophages	8	1610
318	mouse	3	2	400	W/m/m	28	W/kg	1	77	tumor regression	8	1611
319	mouse	2.45	2	500	W/m/m	36	W/kg	7	120	increase in lung cancer colonies and inhibition of contact sensitivity to oxazolone	8	1612
320	rabbit	1.356						3	60	decrease in response to BSA	8	1613
321	mouse	2.45	2	150	W/m/m	10	W/kg	9	30	decrease in CFU for erythroid and granulocyte-macrophage series	8	1432
322	mouse	2.45	2	600	W/m/m	120	W/kg	1	15	reduction in CFU granulocyte-macrophage precursors exposed in vito	8	1614
323	mouse	2.45	2	10000	W/m/m	10000	W/kg	1	15	reduction in CFU granulocyte-macrophage precursors exposed in vito	8	1614

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
324	quail	2.45	2	50	W/m/m			12	1440	no change in cell-mediated or humoral immune response	8	1436
325	rat	0.918	2	25	W/m/m	1	W/kg	91	600	no effect on serum chemistry values	10	1516
326	rabbit	2.45	2	50	W/m/m	0.8	W/kg	1	120	increase in serum glucose; no increase in blood urea nitrogen; no change in uric acid values; no effect on other serum chemistry values	10	1111
327	rabbit	2.45	2	100	W/m/m	1.6	W/kg	1	120	increase in serum glucose; no increase in blood urea nitrogen; increase in uric acid values; no effect on other serum chemistry values	10	1111
328	rabbit	2.45	2	250	W/m/m	4	W/kg	1	120	increase in serum glucose; increase in blood urea nitrogen; increase in uric acid values; no effect on other serum chemistry values	10	1111
329	rabbit	2.45	3	50	W/m/m	0.8	W/kg	1	120	increase in serum glucose; no increase in blood urea nitrogen; no change in uric acid values; no effect on other serum chemistry values	10	1111
330	rabbit	2.45	3	100	W/m/m	1.6	W/kg	1	120	increase in serum glucose; no increase in blood urea nitrogen; increase in uric acid values; no effect on other serum chemistry values	10	1111
331	rabbit	2.45	3	250	W/m/m	4	W/kg	1	120	increase in serum glucose; no increase in blood urea nitrogen; increase in uric acid values; no effect on other serum chemistry values	10	1111
332	rat	1.6	2	800	W/m/m	48	W/kg	1	10	increase iron and manganese levels in brain	10	1517
333	mouse	2.45	2			10.4	W/kg	1	30	decrease in specific metabolic rate (ambient temperature = 24 degree C)	10	1118
334	red blood cell	1	2			5	W/kg	1	4	increase in red blood electrophoretic mobility 30 minutes postexposure (SAR >= 10 W/kg)	10	1518
335	red blood cell	1	2			10	W/kg	1	15	increase in red blood electrophoretic mobility 30 minutes postexposure (SAR >= 10 W/kg)	10	1518
336	red blood cell	1	2			45	W/kg	1	30	increase in red blood electrophoretic mobility 30 minutes postexposure (SAR >= 10 W/kg)	10	1518
337	red blood cell	1	2			45	W/kg	1	30	increase in K+ and Na+ influx	10	1519
338	red blood cell	2.45	2			3	W/kg	1	60	K+ transport no different from heat-treated controls; no change in osmotic fragility	10	1520
339	red blood cell	2.45	2			57	W/kg	1	240	K+ transport no different from heat-treated controls; no change in osmotic fragility	10	1520
340	red blood cell	2.45	2			200	W/kg	1	45	K+ transport not different from controlsat corresponding temperature; no difference in hemoglobin release	10	1521
341	red blood cell	2.45	2			100	W/kg	1	60	passive transport of Na+ and Rb+ increase at transition temperature	10	1522
342	red blood cell	2.45	2			190	W/kg	1	60	passive transport of Na+ and Rb+ increase at transition temperature	10	1522
343	red blood cell	2.45	2			390	W/kg	1	60	passive transport of Na+ and Rb+ increase at transition temperature	10	1522
344	red blood cell	2.45	2			22	W/kg	1	20	no significant changes in K+ efflux, hemoglobin release, or osmotic frgility	10	1068

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
345	red blood cell	3.95	2			200	W/kg	1	180	no significant changes in K+ efflux, hemoglobin release, or osmotic frgility	10	1068
346	escherichia coli containing plasmid pUC8	3	2			10	W/kg	1	270	increase in beta-galatosidase activity	10	1076
347	chicken embryo myoblasts	10.75	2			0.5	W/m/m	1	3	decrease frequency of opening of Ach-activated channels	10	1079
348	red blood cell (rabbit)	2.45	2			100	W/kg	1	60	increase in Na+ permeability	10	1084
349	B 16 melanoma cells	2.45	3			100	W/m/m	1	60	change in membrane fluidity	10	1086
350	red blood cell (human)	2.45	2			6	W/kg	1	20	decrease in membrane ATPase activity	10	1090
351	mouse	2.45	2			8.6	W/kg	1	30	increase in specific metabolic rate (ambient temperature = 35 degree C)	10	1523
352	brain (rat)	0.591	2	138	W/m/m	0.36	W/kg	1	0.5	increase NADH fluorescence	10	1524
353	brain (rat)	0.591	2	138	W/m/m	2.2	W/kg	1	0.5	increase NADH fluorescence	10	1524
354	brain (rat)	0.591	4	100	W/m/m	1.81	W/kg	1	5	increase NADH fluorescence	10	1525
355	brain (rat)	0.591	4	200	W/m/m	3.62	W/kg	1	5	increase NADH fluorescence	10	1525
356	brain (rat)	0.591	3	45	W/m/m	0.82	W/kg	1	5	increase NADH fluorescence	10	1525
357	brain (rat)	0.591	3	132.5	W/m/m	2.38	W/kg	1	5	increase NADH fluorescence	10	1525
358	brain (rat)	0.591	3	30	W/m/m	0.54	W/kg	1	5	increase NADH fluorescence	10	1525
359	brain (rat)	0.591	3	138	W/m/m	2.5	W/kg	1	5	increase NADH fluorescence	10	1525
360	brain (rat)	0.591	3	10	W/m/m	0.18	W/kg	1	5	no change in NADH fluorescence	10	1525
361	brain (rat)	0.591	3	15	W/m/m	0.27	W/kg	1	5	no change in NADH fluorescence	10	1525
362	brain (rat)	0.591	3	30	W/m/m	0.54	W/kg	1	5	no change in NADH fluorescence	10	1525
363	brain (rat)	0.591	2	50	W/m/m	0.13	W/kg	1	0.5	decreased ATP and CP	10	1524
364	brain (rat)	0.591	2	50	W/m/m	0.8	W/kg	1	0.5	decreased ATP and CP	10	1524
365	brain (rat)	0.591	2	138	W/m/m	2.5	W/kg	1	0.5	decreased ATP and CP	10	1525
366	brain (rat)	0.591	4	138	W/m/m	2.5	W/kg	1	0.5	decreased ATP and CP	10	1525
367	brain (rat)	0.591	3	138	W/m/m	2.5	W/kg	1	0.5	decreased ATP and CP	10	1525
368	brain (rat)	0.591	3	138	W/m/m	2.5	W/kg	1	5	no change in ATP; decreased CP	10	1525
369	rat	2.45	3			6.5	W/kg	1	30	increase in oxygen consumption	10	1526

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
370	rat	2.45	3			11.1	W/kg	1	30	increase in oxygen consumption	10	1526
371	monkey	2.45	2	60	W/m/m	0.9	W/kg	1	10	decrease in metabolic heat production	10	1527
372	plasma (human)	2.45	2	100	W/m/m	1.3	W/kg	1	30	no effect on blood coagulation	10	1528
373	plasma (human)	2.45	2	2800	W/m/m	38	W/kg	1	30	no effect on blood coagulation	10	1528
374	bovine serum albumin	1.7	2			30	W/kg	1	30	no change in UV difference spectra measured over pH range 25-55	11	1103
375	bovine serum albumin	1.7	2			100	W/kg	1	30	no change in UV difference spectra measured over pH range 25-55	11	1103
376	ribonuclease	1.7	2			39	W/kg	1	30	UV spectra and binding constants for mononucleotides showed no difference from controls	11	1514
377	glucose-6-phosphate dehydrogenase	2.45	2			42	W/kg	1	5	no change in enzyme activity	11	1102
378	adenylate kinase	2.45	2			42	W/kg	1	5	no change in enzyme activity	11	1102
379	NADPH cytochrome c reductase	2.45	2			42	W/kg	1	5	no change in enzyme activity	11	1102
380	DNA	2.45	2			67	W/kg	1	60	no difference in melting curves	11	1446
381	DNA	2.45	2			160	W/kg	1	960	no difference in melting curves	11	1446
382	horseradish peroxidase	2.45	2			62500	W/kg	1	5	inactivation of emzyme; probably temperature inhomogeneity effect at very high doses	11	1515
383	horseradish peroxidase	2.45	2			375000	W/kg	1	30	inactivation of emzyme; probably temperature inhomogeneity effect at very high doses	11	1515
384	glucose-6-phosphate dehydrogenase	2.8	3			200	W/kg	1	4.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
385	glucose-6-phosphate dehydrogenase	2.8	3			500	W/kg	1	18.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
386	lactate dehydrogenase	2.8	3			200	W/kg	1	4.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
387	lactate dehydrogenase	2.8	3			500	W/kg	1	18.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
388	acid phosphatase	2.8	3			200	W/kg	1	4.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
389	acid phosphatase	2.8	3			500	W/kg	1	18.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
390	alkaline phosphatase	2.8	3			200	W/kg	1	4.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
391	alkaline phosphatase	2.8	3			500	W/kg	1	18.5	heat inactivation of enzymes found at higher SAR (T = 50 degree C) corresponded closely to heat-treated controls	11	1104
392	lactate dehydrogenase	3	2			33	W/kg	1	20	heat inactivation of enzymes found at SAR > 165 W/kg	11	1105
393	lactate dehydrogenase	3	2			165	W/kg	1	20	heat inactivation of enzymes found at SAR > 165 W/kg	11	1105
394	lactate dehydrogenase	3	2			960	W/kg	1	20	heat inactivation of enzymes found at SAR > 165 W/kg	11	1105
395	rabbit	3	3	200	W/m/m	3	W/kg	1	20	desynchronized EEG	12	1281
396	rabbit	3	3	70	W/m/m	1	W/kg	25	180	greater effect of CNS stimulating drugs	12	1281
397	mouse	3	3	50	W/m/m	5	W/kg	22		biphasic effect of latency to a convulsive drug effect	12	1284
398	rat	3	3	50	W/m/m	1	W/kg	12.5		decreased effect of paralyzing drugs	12	1284
399	rabbit	9.3	2	7	W/m/m	0.1	W/kg	1	5	changes in EEG patterns of unanesthetized animals	12	1544
400	rabbit	9.3	2	28	W/m/m	0.3	W/kg	1	5	changes in EEG patterns of unanesthetized animals	12	1544
401	rat (male)	2.45	3	10	W/m/m	0.2	W/kg	1	30	potentiation of drug response	12	1545
402	rat (male)	2.45	3	10	W/m/m	0.2	W/kg	1	30	potentiation of drug response	12	1546
403	rat	1.6	2	800	W/m/m	24	W/kg	1	10	decreased hypothalamic NE, DA, and hippocampal serotonin in hyperthermic animals	12	1547
404	rat	1.6	2	200	W/m/m	6	W/kg	1	10	decreased hypothalamic NE, DA	12	1548
405	rat	1.6	2	800	W/m/m	24	W/kg	1	10	decreased hypothalamic NE, DA	12	1548
406	rat	1.6	2	100	W/m/m	3	W/kg	1	10	no effect on neurotransmitter levels	12	1548
407	rat	2.86	3	800	W/m/m	16	W/kg	1	5	no effect on GABA content	12	1549
408	rat	2.86	3	400	W/m/m	8	W/kg	1	20	no effect on GABA content	12	1549
409	rat	2.86	3	100	W/m/m	2	W/kg	5	480	no effect on GABA content	12	1549
410	rat	2.86	3	100	W/m/m	2	W/kg	40	240	no effect on GABA content	12	1549
411	hamster (chinese)	2.45	2	500	W/m/m	1.5	W/kg	1	30	swollen neurons in hypothalamus and subthalamus	12	1253
412	hamster (chinese)	2.45	2	250	W/m/m	7.5	W/kg	22	840	swollen neurons in hypothalamus and subthalamus	12	1253

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
413	hamster (chinese)	1.7	2	100	W/m/m	3	W/kg	1	75	swollen neurons in hypothalamus and subthalamus	12	1550
414	rat (female)	2.45	2	100	W/m/m	2.3	W/kg	110	300	myelin figures in dendrites 6 weeks postexposure	12	1551
415	rat	1.2	2	24	W/m/m	1	W/kg	1	30	increased permeability of BBB to fluorescein	12	1552
416	rat	1.2	3	2	W/m/m	0.08	W/kg	1	30	increased permeability of BBB to fluorescein	12	1552
417	guinea pig	3	2	35	W/m/m	0.5	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
418	guinea pig	3	2	250	W/m/m	3.5	W/kg	1	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
419	guinea pig	3	2	50	W/m/m	0.4	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
420	guinea pig	3	3	35	W/m/m	0.5	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
421	guinea pig	3	3	250	W/m/m	3.5	W/kg	1	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
422	guinea pig	3	3	50	W/m/m	0.4	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
423	rabbit	3	2	35	W/m/m	0.5	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
424	rabbit	3	2	250	W/m/m	3.5	W/kg	1	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
425	rabbit	3	2	50	W/m/m	0.4	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
426	rabbit	3	3	35	W/m/m	0.5	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
427	rabbit	3	3	250	W/m/m	3.5	W/kg	1	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
428	rabbit	3	3	50	W/m/m	0.4	W/kg	90	180	myelin degeneration and metabolic alterations; glial cell proliferation	12	1553
429	hamster (chinese)	2.8	2	100	W/m/m	1.9	W/kg	1	120	focal areas of increased BBB permeability to peroxidase	12	1261
430	rat	2.8	2	100	W/m/m	0.9	W/kg	1	120	focal areas of increased BBB permeability to peroxidase	12	1261
431	hamster (chinese)	2.45	2	100	W/m/m	2.5	W/kg	1	120	increased peroxidase in brain, absent after recovery period	12	1262
432	hamster (chinese)	2.45	2	100	W/m/m	2.5	W/kg	1	120	increased peroxidase in brain	12	1254
433	rat	2.45	2	80	W/m/m	0		1	20	brain temperature elevation (40-45 degree C); increased permeability of BBB	12	1554
434	rat	1.3	2	10	W/m/m	0.4	W/kg	1	120	increased permeability of BBB (mannitol and inulin)	12	1264
435	rat	1.3	3	3	W/m/m	0.1	W/kg	1	120	increased permeability of BBB (mannitol and inulin)	12	1264
436	rabbit	0.001	1	60	Vrms/m	1E-05	W/kg	1	120	EEG effects seen after chronic, but not acute, exposures	12	1555
437	rabbit	0.01	1	500	Vrms/m	0.0001	W/kg	1	180	EEG effects seen after chronic, but not acute, exposures	12	1555
438	rabbit	0.001	1	90	Vrms/m	0.0001	W/kg	20	120	EEG effects seen after chronic, but not acute, exposures	12	1555

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
439	rabbit	0.01	1	500	Vrms/m	0.001	W/kg	30	180	EEG effects seen after chronic, but not acute, exposures	12	1555
440	cat	0.147	1	10	W/m/m	0.015	W/kg	0	0	change of predominant EEG frequencies	12	1556
441	rat	3	0	100	W/m/m	2	W/kg	35	30	reversible meuronal morphology alterations	12	1557
442	rat	3	0	100	W/m/m	2	W/kg	35	30	reversible meuronal morphology alterations	12	1219
443	rat	2.45	2	75	W/m/m	0		1	4.75	mild pyknosis of hyppocampal neurons, increased brain, and colonic temperature	12	1558
444	rat	3	0	400	W/m/m	8	W/kg	1	60	increased brain serotonin turnover rate	12	1559
445	rat	3	0	100	W/m/m	2	W/kg	7	480	increased brain serotonin turnover rate	12	1559
446	monkey (squirrel)	2.45	0	100	W/m/m	3.4	W/kg	368	180	no decrease in cerebellar purkinje cells in offspring	12	1259
447	rat	2.45	0	100	W/m/m	2	W/kg	5	1260	decreased cerevellar purkinje cells after perinatal exposure	12	1258
448	rat	0.1	0	460	W/m/m	2.7	W/kg	110	240	decreased cerevellar purkinje cells after perinatal exposure	12	1258
449	rat	1.25	3			7300	W/kg	0	0.053	involuntary tail flick	12	1225
450	rat	2.45	2	100	W/m/m	2	W/kg	5	420	inflammation, necrosis of brain tissue	12	1247
451	rat	2.45	3	100	W/m/m	2	W/kg	0	0	enhanced uptake of rhodamine-ferritin complex by cerebral endothelial cells	12	1263
452	rat	3.15		30000	W/m/m			1	15	ethanol inhibits microwave-induced permeation of blood-brain-barrier	12	1277
453	rat	2.45	2			0.6	W/kg	1	45	decreased in choline uptake in frontal cortex	12	1287
454	rat	2.45	3			0.6	W/kg	1	45	decreased in choline uptake in frontal cortex	12	1287
455	dog	2.45	2	720	W/m/m	58	W/kg	1	120	increased thyroxine and triidothyronine	13	1382
456	dog	2.45	2	2360	W/m/m	190	W/kg	1	120	increased thyroxine and triidothyronine	13	1382
457	dog	2.45	2	720	W/m/m	58	W/kg	1	120	increased thyroxine and triidothyronine	13	1383
458	dog	2.45	2	2360	W/m/m	190	W/kg	1	120	increased thyroxine and triidothyronine	13	1383
459	rat	2.45	2	100	W/m/m	0.25	W/kg	1	10	no effect on thyroid gland or thyroid hormone	13	1380
460	rat	2.45	2	1000	W/m/m	25	W/kg	1	45	no effect on thyroid gland or thyroid hormone	13	1380
461	rat	2.45	2	10	W/m/m	0.25	W/kg	56	480	no effect on thyroid gland or thyroid hormone	13	1380
462	rat	2.45	2	100	W/m/m	2.5	W/kg	56	480	no effect on thyroid gland or thyroid hormone	13	1380
463	rat	2.45	2	100	W/m/m	2	W/kg	1	240	no effect on thyroid function	13	1378
464	rat	2.45	2	200	W/m/m	5	W/kg	1	600	no effect on thyroid function	13	1378
465	rat	2.45	2	250	W/m/m	6.5	W/kg	1	960	no effect on thyroid function	13	1378

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
466	rat	2.45	2	150	W/m/m	3.8	W/kg	2.5	1440	decrease in serum protein-bound iodide, thyroxine, and thyroxine/serum ratio	13	1378
467	rat	3	3	50	W/m/m	0.25	W/kg	40	180	increase in thyroid hormone	13	1381
468	rat	3	3	50	W/m/m	0.75	W/kg	40	180	increase in thyroid hormone	13	1381
469	rat	2.45	2	200	W/m/m	5	W/kg	1	360	decrease inserum thyroxine levels	13	1385
470	rat	2.45	2	10	W/m/m	0.25	W/kg	1	60	no effect on inserum thyroxine levels	13	1385
471	rat	2.45	2	100	W/m/m	2.5	W/kg	1	480	no effect on inserum thyroxine levels	13	1385
472	rat	2.45	1	400	W/m/m	8.4	W/kg	1	60	increase in corticosterone levels	13	1584
473	rat	2.45	1	700	W/m/m	14	W/kg	1	60	increase in corticosterone levels	13	1584
474	rat	2.45	1	10	W/m/m	0.21	W/kg	1	60	no effect on corticosterone levels	13	1584
475	rat	2.45	1	200	W/m/m	4.2	W/kg	1	60	no effect on corticosterone levels	13	1584
476	rat	2.45	1	400	W/m/m	2.1	W/kg	1	60	decrease in thyrotropin levels	13	1584
477	rat	2.45	1	700	W/m/m	8.4	W/kg	1	60	decrease in thyrotropin levels	13	1584
478	rat	2.45	1	10	W/m/m	0.21	W/kg	1	60	no effect in thyrotropin levels	13	1584
479	rat	2.45	1	200	W/m/m	4.2	W/kg	1	60	no effect in thyrotropin levels	13	1584
480	rat	2.45	1	100	W/m/m	2.1	W/kg	1	240	increase in corticosterone levels	13	1584
481	rat	2.45	1	400	W/m/m	8.4	W/kg	1	240	increase in corticosterone levels	13	1584
482	rat	2.45	1	10	W/m/m	0.2	W/kg	1	240	no effect on corticosterone levels	13	1584
483	rat	2.45	1	50	W/m/m	1	W/kg	1	240	no effect on corticosterone levels	13	1584
484	rat	2.45	1	250	W/m/m	0.6	W/kg	1	240	decrease in thyrotropin levels	13	1584
485	rat	2.45	1	400	W/m/m	2.1	W/kg	1	240	decrease in thyrotropin levels	13	1584
486	rat	2.45	1	10	W/m/m	0	W/kg	1	240	no effect in thyrotropin levels	13	1584
487	rat	2.45	1	200	W/m/m	1	W/kg	1	240	no effect in thyrotropin levels	13	1584
488	rat	2.45	2	10	W/m/m	0.25	W/kg	1	60	no effect on thyroid, pituitary, or adrenal gland weights or growth hormone levels	13	1385
489	rat	2.45	2	200	W/m/m	2.5	W/kg	1	480	no effect on thyroid, pituitary, or adrenal gland weights or growth hormone levels	13	1385
490	rat	2.86	2	100	W/m/m	1	W/kg	36	360	no effect on thyroid, anterior pituitary gland, adrenal, prostate, or testes weights; no change in follocle-stimulating hormone or gonadotropic hormone levels; increase in leutinizing hormone	13	1585

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
491	rat	2.88	2	100	W/m/m	2	W/kg	36	360	no effect on thyroid, anterior pituitary gland, adrenal, prostate, or testes weights; no change in follocle-stimulating hormone or gonadotropic hormone levels; increase in leutinizing hormone	13	1585
492	rat (infant)	2.45	2	400	W/m/m	20	W/kg	6	5	increased adrenal weights and significant response	13	1536
493	rat (infant)	2.45	2	400	W/m/m	60	W/kg	6	5	increased adrenal weights and significant response	13	1536
494	rat	2.45	2	500	W/m/m	11.5	W/kg	1	30	increased plasma corticosterone levels	13	1365
495	rat	2.45	2	600	W/m/m	13.8	W/kg	1	60	increased plasma corticosterone levels	13	1365
496	rat	2.45	2	130	W/m/m	3	W/kg	1	30	no effect plasma corticosterone levels	13	1365
497	rat	2.45	2	400	W/m/m	9.2	W/kg	1	60	no effect plasma corticosterone levels	13	1365
498	rat	2.45	2	200	W/m/m	4.6	W/kg	1	120	increased plasma corticosterone levels	13	1365
499	rat	2.45	2	400	W/m/m	9.2	W/kg	1	120	increased plasma corticosterone levels	13	1365
500	rat	2.45	2	130	W/m/m	3	W/kg	1	120	no effect plasma corticosterone levels	13	1365
501	rat	2.45	1	500	W/m/m	8.3	W/kg	1	60	increase in corticosterone levels	13	1586
502	rat	2.45	1	600	W/m/m	9.6	W/kg	1	60	increase in corticosterone levels	13	1586
503	rat	0.918	2	25	W/m/m	1	W/kg	91	600	no effect on serum corticosterone levels	13	1516
504	mouse	1.7	0	100	W/m/m	15	W/kg	1	99	no change	16	1062
505	mouse	1.7	0	100	W/m/m	15	W/kg	1	100	abnormal germinal cells, normal interstitial cells	16	1062
506	mouse	1.7	0	500	W/m/m	75	W/kg	1	35	all tissue necrotic, altered spermatogenesis	16	1062
507	mouse	1.7	0	2000	W/m/m	300	W/kg	1	20	scrotal skin burns	16	1062
508	mouse	3	0	500	W/m/m	50	W/kg	1	20	minimal injury	16	1062
509	mouse	1.7	0	100	W/m/m	15	W/kg	1	99	no change	16	1066
510	mouse	1.7	0	100	W/m/m	15	W/kg	1	100	abnormal germinal cells, normal interstitial cells	16	1066
511	mouse	1.7	0	500	W/m/m	75	W/kg	1	35	all tissue necrotic, altered spermatogenesis	16	1066
512	mouse	1.7	0	2000	W/m/m	300	W/kg	1	20	scrotal skin burns	16	1066
513	mouse	3	0	500	W/m/m	50	W/kg	1	20	minimal injury	16	1066
514	mouse	2.45		370	W/m/m	8	W/kg		960	no change in tissue, sperm	16	1529
515	rat	2.45		800	W/m/m	16	W/kg	1	10	abnormal spermatogenic tissue	16	1530
516	rat	2.45		50	W/m/m	0.9	W/kg		240	no chnage	16	1064
517	rat	2.45		50	W/m/m	4.5	W/kg		240	no change	16	1064
518	rat	2.45		100	W/m/m	2	W/kg	5	240	no change	16	1064

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
519	rat	2.45		280	W/m/m	5.6	W/kg	20	240	temporary sterility	16	1064
520	mouse	9.27	3	1000	W/m/m			295	4.5	testicular degeneration	16	1531
521	mouse	10	3	4000	W/m/m			1	5	testicular lesions	16	1138
522	mouse	10	3	3.44	W/m/m			50	30	no change	16	1532
523	rat	24		250	W/m/m			1	5	testicular damage	16	1533
524	rat	1.3	2			9	W/kg	1	480	no change in sperm production, circulatory FSH or LH	16	1143
525	rat	1.3	3			7.7	W/kg	13	90	destruction of germinal cells	16	1144
526	tenebrio molitor	10		170	W/m/m	40	W/kg	1	120	20% of beetles normal, 76% has gross abnormalities, 4% died	15	2018
527	tenebrio molitor	10		680	W/m/m	160	W/kg	1	25	24% of beetles normal, 51% has gross abnormalities, 25% died	15	2018
528	tenebrio molitor	9	2	171	W/m/m	41	W/kg	1	120	significant incidences of terata	15	2072
529	tenebrio molitor	9	2	86	W/m/m	21	W/kg	1	120	significant incidences of terata	15	2072
530	tenebrio molitor	9	3	171	W/m/m	41	W/kg	1	120	significant incidences of terata	15	2072
531	tenebrio molitor	9	3	86	W/m/m	21	W/kg	1	120	significant incidences of terata	15	2072
532	tenebrio molitor	9		1.7	W/m/m	0.41	W/kg	1	120	significant incidences of terata	15	2073
533	tenebrio molitor	9		340	W/m/m	80	W/kg	1	120	a slight increase in terata with RFR level	15	2040
534	tenebrio molitor	9		2720	W/m/m	640	W/kg	1	120	further terata increase	15	2040
535	tenebrio molitor	5.95	2	560	V/m	806	W/kg	1	30	kill most of the pupae	15	2083
536	tenebrio molitor	5.95	2			50	W/kg	1	240	no deaths or defects	15	2083
537	tenebrio molitor	5.95	2			106	W/kg	1	240	defects in half the insects	15	2083
538	tenebrio molitor	4	2	602	V/m	29.1	W/kg	1	240	no defects	15	2083
539	tenebrio molitor	6		22	W/m/m	130	W/kg	1	120	the differences in anomaly incidences from E-field exposure were not significant, but gross abnormalities were much higher in control"K-pupae" than in control "colony-prupae". other results were ambiguous	15	2090
540	tenebrio molitor	6		883	W/m/m	54	W/kg	1	120	the differences in anomaly incidences from E-field exposure were not significant, but gross abnormalities were much higher in control"K-pupae" than in control "colony-prupae". other results were ambiguous	15	2090
541	tenebrio molitor	6		110	W/m/m	130	W/kg	1	780	the differences in anomaly incidences from E-field exposure were not significant, but gross abnormalities were much higher in control"K-pupae" than in control "colony-prupae". other results were ambiguous	15	2090
542	tenebrio molitor	10		50	W/m/m	45	W/kg	1	240	the differences in anomaly incidences from E-field exposure were not significant, but gross abnormalities were much higher in control"K-pupae" than in control "colony-prupae". other results were ambiguous	15	2090

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
543	tenebrio molitor	6				208	W/kg	1	90	temperature dependence of anomaly incidences; 40 degree C hyperthermia threshold for effects	15	2084
544	egg (japanese quail)	2.45	2	300	W/m/m	14	W/kg	4	300	sought in hatchlings were lower weights, gross abnormalities, and effects on various blood parameters. differences between RFR and sham groups not significant	15	2075
545	egg (japanese quail)	2.45		50	W/m/m	4	W/kg	12	1440	no gross deformities were found in the quail when they were euthanized and examined 24 to 36 hours after	15	2076
546	egg (japanese quail)	2.45		50	W/m/m	4	W/kg	12	1440	no significant differences in mortality or mean body weights at 4 and 5 weeks were found between RFR and sham-exposed hatched quail	15	2046
547	egg (japanese quail)	2.45		50	W/m/m	4.03	W/kg	12	1440	significant differences in body and brain weights of RFR-exposed embryos, no significant differences between RFR and sham group in brain-to-body weight ratios, slight cerebellum retardation in embryos had no effect on later quail development	15	2052
548	egg (japanese quail)	2.45		50	W/m/m	4.03	W/kg	13	1440	no significant differences in body and brain weights and brain-to-body weight ratios between RFR and sham groups, slight cerebellum retardation in embryos had no effect on later quail development	15	2052
549	egg (japanese quail)	2.45		50	W/m/m	4.03	W/kg	14	1440	brain but not body weights significantly smaller than controls, no significant differences between RFR and sham group in brain-to-body weight ratios, slight cerebellum retardation in embryos had no effect on later quail development	15	2052
550	egg (japanese quail)	2.45		50	W/m/m	4	W/kg	12	1440	RFR-exposed quail had no significant differences in sperm counts, morphology, or testes weights, but lower motility than controls	15	2077
551	egg (japanese quail)	2.45		250	W/m/m	12.5	W/kg	17	30	no significant differences in egg-mass loss, hatchability, or chick weights between RFR and sham groups	15	2017
552	egg (japanese quail)	2.45		500	W/m/m	25	W/kg	17	30	no abnormalities seen, but hatchability was much lower than controls	15	2017
553	egg (japanese quail)	2.45		50	W/m/m	4	W/kg	12	1440	no significant differences in hatchability, mortality after hatching, egg production, egg weight, fertility of the initial groups, and reproduction between RFR and sham-exposed	15	2038
554	egg (japanese quail)	2.45		50	W/m/m	3.3	W/kg	8	480	no significant differences in fertility, or viability between RFR and sham-exposed	15	2098
555	egg (japanese quail)	2.45		200	W/m/m	13.2	W/kg	8	480	no significant differences in fertility, or viability between RFR and sham-exposed	15	2098
556	egg (chicken)	2.45		34.6	W/m/m			5	480	RFR-exposure at 32 degree C embryo temperature yielded significant later embryo development than controls; converse results were seen at 36 degree C, and no difference at 34 degree C	15	2033
557	egg (chicken)	0.428		55	W/m/m	3.1	W/kg	1	1440	means hatchabilities were 38.0% and 84.2% for RFR and sham-exposed, respectively; no abnormalities were seen in tissue examination by light microscopy	15	2094

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
558	egg (chicken)	0.428		55	W/m/m	33	W/kg	1	1440	means hatchabilities were 38.0% and 84.2% for RFR and sham-exposed, respectively; no abnormalities were seen in tissue examination by light microscopy	15	2094
559	egg (chicken)	2.45		36	W/m/m	2.9	W/kg	7	1440	there were no significant hatchability differences relative to their control groups	15	2012
560	egg (chicken)	2.45		36	W/m/m	2.9	W/kg	14	1440	there were no significant hatchability differences relative to their control groups	15	2012
561	egg (chicken)	2.45		36	W/m/m	2.9	W/kg	19	1440	there were no significant hatchability differences relative to their control groups	15	2012
562	egg (chicken)	6	2	2	W/m/m					no significant effects were seen on the hatchability or growth of either fowl species up to two weeks of age	15	2051
563	egg (turkey)	6	2	2	W/m/m					no significant effects were seen on the hatchability or growth of either fowl species up to two weeks of age	15	2051
564	egg (chicken)	24.5	2	510	W/m/m			1	4	no significant differences were seen in chick body weights or mortality up to age two weeks	15	2051
565	egg (chicken)	24.5	2	1230	W/m/m			1	3	no significant differences were seen in chick body weights or mortality up to age two weeks	15	2051
566	egg (chicken)	24.5	2	2460	W/m/m			1	1.5	no significant differences were seen in chick body weights or mortality up to age two weeks, exposures after 1 or 2 days of incubation caused reduced hatching or failure to hatch	15	2051
567	egg (chicken)	24.5	2	10200	W/m/m			1	0.75	no significant differences were seen in chick body weights or mortality up to age two weeks, exposures after 1 or 2 days of incubation caused reduced hatching or failure to hatch	15	2051
568	semen (turkey)	24.5	2			1	W/kg	1	0.5	RFR-exposures had no adverse effects on turkey sperm	15	2043
569	semen (turkey)	24.5	2			50	W/kg	1	0.5	RFR-exposures had no adverse effects on turkey sperm	15	2043
570	semen (turkey)	24.5	2			10	W/kg	1	0.5	no significant RFR-related differences in mean pH, or in egg laying, fertility, or hatchability were seen among the 6 treatment groups	15	2044
571	semen (turkey)	24.5	2			50	W/kg	1	0.5	no significant RFR-related differences in mean pH, or in egg laying, fertility, or hatchability were seen among the 6 treatment groups	15	2044
572	mouse (C3H/He pergnant)	0.000025		616200	W/m/m			50	60	no effects on growth, reproductive ability, or metabolism for neonates from RFR and sham-exposed dams; no incidence of C3H/He-mouse mammary-tumor development up to 98 days of age	15	2011
573	mouse (C3H/He pergnant)	0.000025		308600	W/m/m			50	60	no effects on growth, reproductive ability, or metabolism for neonates from RFR and sham-exposed dams; no incidence of C3H/He-mouse mammary-tumor development up to 98 days of age	15	2011
574	mouse (C3H/He, 4 days old)	0.000025		616200	W/m/m			100	60	no pathologic changes or effects on organ weights or hematologic assays of pups; no incidence of C3H/He-mouse mammary-tumor development up to 98 days of age	15	2011

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
575	mouse (C3H/He, 4 days old)	0.000025		308600	W/m/m			100	60	no pathologic changes or effects on organ weights or hematologic assays of pups; no incidence of C3H/He-mouse mammary-tumor development up to 98 days of age	15	2011
576	mouse	0.0266	2	89000	W/m/m	3.6	W/kg	1	20	no effect on growth	5	1537
577	mouse (adult)	2.45	2	8000	V/m			5	40	no significant cyclic-AMP differences among RFR, thermal-control, and cage-control groups	15	2100
578	mouse (pregnant CD-1)	2.45	2	34	W/m/m	2	W/kg	17	100	the mean live fetal weights of the RFR exposed were not significantly different from those of the sham-exposed litters	15	2005
579	mouse (pregnant CD-1)	2.45	2	136	W/m/m	8.1	W/kg	17	100	the mean live fetal weights of the RFR exposed were not significantly different from those of the sham-exposed litters	15	2005
580	mouse (pregnant CD-1)	2.45	2	140	W/m/m	8.3	W/kg	17	100	the mean live fetal weights of the RFR exposed were not significantly different from those of the sham-exposed litters	15	2005
581	mouse (pregnant CD-1)	2.45	2	280	W/m/m	22.2	W/kg	10	100	the mean live fetal weights of the RFR exposed were significantly lower than the sham-exposed litters	15	2005
582	mouse (pregnant CD-1)	2.45	2	280	W/m/m	16.5	W/kg	12	100	RFR-exposed: no significant differences in live, dead, and resorbed fetus count on gesation day 18; ossification of sternal centers delayed; weights of 7-day-old pups were 10% lower.	15	2007
583	mouse (pregnant CD-1)	2.45	2	280	W/m/m	16.5	W/kg	12	100	significantly lower body and brain weights (by 10%) for neonates from RFR-exposed dams; no differences in ability to concentrate urine or in tolerance to ouabain.	15	2010
584	hamster (syrian)	2.45	2	200	W/m/m	6	W/kg	9	100	no significant effect in fetal survival, body weight, skeletal maturity, or incidence of terate. raised rectal temperatures by about 0.4 degree C.	15	2008
585	hamster (syrian)	2.45	2	300	W/m/m	9	W/kg	9	100	significant higher fetal resorptions, lower fetal body weights, and delayed skeletal maturity. raised rectal temperatures by about 1.6 degree C.	15	2008
586	mouse (pregnant CD-1)	2.45	2	50	W/m/m	6.7	W/kg	15	480	differences in numbers of pregnanices, maternal weight gains, and fetal weights for nonhandled-RFR- and sham-exposed dams nonsignificant. the handling was the primary factor in the differences	15	2081
587	mouse (pregnant CD-1)	2.45	2	210	W/m/m	28.1	W/kg	5	480	differences in numbers of pregnanices, maternal weight gains, and fetal weights for nonhandled-RFR- and sham-exposed dams nonsignificant. the handling was the primary factor in the differences	15	2081
588	mouse (pregnant CD-1)	2.45	2	210	W/m/m	28.1	W/kg	10	480	differences in numbers of pregnanices, maternal weight gains, and fetal weights for nonhandled-RFR- and sham-exposed dams nonsignificant. the handling was the primary factor in the differences	15	2081
589	mouse (pregnant CD-1)	2.45	2	300	W/m/m	40.2	W/kg	5	480	the threshold for teratogenic effect is about 300 W/m/m (40.2 W/kg).	15	2081
590	mouse (pregnant CD-1)	2.45	2	300	W/m/m	40.2	W/kg	10	480	the threshold for teratogenic effect is about 300 W/m/m (40.2 W/kg).	15	2081

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
591	mouse (pregnant CD-1)	2.45	2	300	W/m/m	40.2	W/kg	5	480	pregnancy rate of RFR groups was lower than for other groups	15	2082
592	mouse (pregnant CD-1)	2.45	2	300	W/m/m	40.2	W/kg	10	480	fetal weight gains were smaller for the handled-RFR-exposed and handled-heated groups than for the other groups	15	2082
593	mouse (female CD-1)	2.45	2	90	W/m/m	11.7	W/kg	1	180	on gestation day 4, no significant differences were seen between RFR and sham groupsin embryo counts, abnormalities, and developmental stage.	15	2053
594	mouse (female CD-1)	2.45	2	190	W/m/m	24.7	W/kg	1	180	on gestation day 4, no significant differences were seen between RFR and sham groupsin embryo counts, abnormalities, and developmental stage.	15	2053
595	mouse	3	3	80	W/m/m	3.25	W/kg	20	300	histochemical changes in the brains of pups (seen by fluorescence spectrophotometry) were ascribed primarily to postnatal RFR-exposure. no data were presented on the incidences of terata.	15	2021
596	rat (pregnant)	0.02712		55	W			16	10	the major abnormalities seen were neurocranial malformations, kinked or short tails and hand defects, and cleft palate. the highest incidences were for exposure on days 13, and 14	15	2026
597	rat (pregnant)	2.45	2	400	W/m/m	6	W/kg	10	100	differences between RFR and sham groups in counts of live, dead, resorbed fetuses, and total implants were not significant. the weight of live fetuses and number of ossified sternebrae from the RFR groups were significant lower than for the sham groups	15	2009
598	rat (pregnant)	0.02712		1380	W/m/m	11.8	W/kg	8	30	on day 20, significantly higher effects were seen in RFR groups than in sham groups and cage controls treated on corresponding days, with highest embryotoxicity for exposure on day 9. the teratogenic effects were clearly thermal.	15	2067
599	rat (pregnant)	0.02712		1380	W/m/m	11.8	W/kg	1	56.5	the severity of the teratogenic effect increased with colonic temperature and duration of maintenance ataeach temperature.	15	2068
600	rat (pregnant)	0.1	2	250	W/m/m	0.4	W/kg	6	400	no significant differences were seen between RFR-exposed and sham-exposed groups in any of tabulated teratogenic endpoints. only 64% of live fetuses from the RFR group had skeletal variations vs 76% from the sham group.	15	2069
601	rat (pregnant)	0.02712	2	1380	W/m/m	10.8	W/kg	1	25	the exposures were terminated when colonic-temperature reached 41.0, 41.5, 42.0, 42.5, or 43.0 degree C. the results indicated the existence of a colonic temperature threshold of 41.5 degree C for birth defects and prenatal death.	15	2070
602	rat (female)	2.45		100	W/m/m	1.76	W/kg	18	180	no significant difference in malformation.	15	2054
603	rat (infant)	2.45		1200	W/m/m	12.48	W/kg	39	180	the RFR and sham pups at correspondings ages in brain weights, cerebral dimensions, histologic endpoints, and the purkinje-cell counts in the corresponding cerebrllar lobules were all not significant differences.	15	2054

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
604	rat (pregnant)	0.02712		1	W/m/m	0.0001	W/kg	20	1440	no dead fetuses were found. the RFR effect of resorptions occurs during the early stage of egg development. mean litter weight of RFR-exposed was significantly lower than sham groups	15	2104
605	rat (pregnant)	0.02712		5	W	2.8	W/kg	1	60	with the erbe unit, the numbers of live embryos rose and the resorptions fell with increasing RFR level, whereas opposite trends were observed with the enraf unit. no significant differences were seen in mean embroy weight.	15	2013
606	rat (pregnant)	0.02712		10	W	4.2	W/kg	1	45	with the erbe unit, the numbers of live embryos rose and the resorptions fell with increasing RFR level, whereas opposite trends were observed with the enraf unit. no significant differences were seen in mean embroy weight.	15	2013
607	rat (pregnant)	0.02712		15	W	5.6	W/kg	1	30	with the erbe unit, the numbers of live embryos rose and the resorptions fell with increasing RFR level, whereas opposite trends were observed with the enraf unit. the only one of 86 embryo exhibited abnormalities.	15	2013
608	rat (pregnant)	0.02712	3	33000	V/m	11.2	W/kg			core temperatures raised by 2.5 degree C and held for 50 or 60 min. yielded resorption rates higher than for the controls (4%), but yielded no abnormal fetuses. the severity of teratogic effects rose with the larger core-temperature increments	15	2014
609	rat (virgin)	0.02712		450	V/m			25	60	no teratogenic effects were found, but fewer RFR-exposed rats had mated and fewer of those became pregnant	15	2015
610	rat (pregnant)	0.915		100	W/m/m	4	W/kg	20	360	on gestation day 22, no significant differences were seen between the RFR and sham groups in weights of maternal brain, liver, kidneys, or ovaries, or in litter sizes or fetal weights	15	2056
611	rat (pregnant)	0.915		100	W/m/m	4	W/kg	20	360	the weights of RFR-exposed pups of the first dam breeding were significantly higher than of sham-exposed pups, but no significant teratogenic effects were seen in those pups	15	2057
612	rat (pregnant)	2.45		200	W/m/m	3.6	W/kg	20	360	on gestation day 22, no differences were seen between RFR-exposed and sham-exposed dams in any of the dam endpoints, and no terata were evident in the fetuses.	15	2058
613	rat (pregnant)	2.45		200	W/m/m	5.2	W/kg	20	360	on gestation day 22, no differences were seen between RFR-exposed and sham-exposed dams in any of the dam endpoints, and no terata were evident in the fetuses.	15	2058
614	rat (pregnant)	6		350	W/m/m	7.28	W/kg	20	360	no teratogenic effects were seen, but the mean fetal weight at term was significantly lower for the RFR group than the sham group. the latter efect may not have been RFR-related because of fetal-weight differences among control groups.	15	2060
615	rat (pregnant)	6		350	W/m/m	7.28	W/kg	20	360	the mean weight gain of RFR-exposed dams was significantly lower for the sham-exposed dams, but there were also comparable differences among control groups.	15	2061

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
616	rat (pregnant)	6	3	20	W/m/m	0.4	W/kg	17	1440	on gestation day 18, no significant differences were seen between RFR and sham groups in fetal body or brain weights, or in assays of brain RNA, DNA, or protein. also, no litter was microencephalous.	15	2078
617	neuron (aplysia)	1.5	2			1	W/kg	1	3	rapid response in change of firing rate of pacemaker neurons which does not correlate with temperature changes in minority of trials	12	1512
618	neuron (aplysia)	2.45	3			100	W/kg	1	3	rapid response in change of firing rate of pacemaker neurons which does not correlate with temperature changes in minority of trials	12	1512
619	escherichia coli	2.45	2			29	W/kg	1	720	no change in growth or colony forming unit (CFU) of exposed cultures	8	3309
620	escherichia coli	2.45	2			320	W/kg	1	720	no change in growth or colony forming unit (CFU) of exposed cultures	8	3309
621	p. aeruginosa	2.45	2			29	W/kg	1	720	no change in growth or colony forming unit (CFU) of exposed cultures	8	3309
622	p. aeruginosa	2.45	2			320	W/kg	1	720	no change in growth or colony forming unit (CFU) of exposed cultures	8	3309
623	lung cell (chinese hamster, V79)	2.45	2			1059	W/kg	1	20	growth rate slowed; morphological changes found.	5	3130
624	p. fischeri	2.6	2			660	W/kg	1	22	no change in light emission of photoactive bacterium	10	3054
625	p. fischeri	3	2			5300	W/kg	1	22	no change in light emission of photoactive bacterium	10	3054
626	monkey (rhesus)	0.01	2	13200	W/m/m	0.4	W/kg	1	30	increase mitosis of PHA-stimulated lymphocytes	8	3532
627	monkey (rhesus)	0.027	2	13200	W/m/m	2	W/kg	1	30	increase mitosis of PHA-stimulated lymphocytes	8	3532
628	mouse	2.45	2			10	W/kg	1	30	increase in CR+ spleen cells, strain specificity	8	1427
629	mouse	2.45	2			19	W/kg	1	30	increase in CR+ spleen cells, strain specificity	8	1427
630	mouse	2.45	2	40	W/m/m	28	W/kg	1	30	increase in CR+ spleen cells	8	1428
631	mouse	2.45	2	20	W/m/m	12	W/kg	1	120	increase lethality to endotoxin	8	3544
632	mouse	2.45	2	30	W/m/m	18	W/kg	1	120	increase lethality to endotoxin	8	3544
633	mouse	2.45	2	30	W/m/m	21	W/kg	5	90	decrease in NK activity, increase in macrophage phagocytosis	8	3621
634	mouse	2.45	2	25	W/m/m	13	W/kg	1	60	decrease in NK activity	8	1429
635	mouse	2.45	2	25	W/m/m	13	W/kg	1	60	increase in macrophage viricidal capacity	8	3537
636	drosophila melanogaster	2.45				640	W/kg	1	10	30% survival of pupae of RFR-exposed, the death rate was less severe (50%) of pupae were incubated without RF radiation.	15	3512
637	cat	0.918	2	26	W/m/m	2.5	W/kg	1	15	decrease latency of late components of thalamic somatosensory evoked potentials	12	1239
638	cat	2.45	2	3.75	W	800	W/kg	1	3	attenuation of monosynaptic spinal reflex	12	3664

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
639	saccharomyces cerevisiae	17	2			28	W/kg	1	30	no effect on mutation or meiosis efficiency	4	1503
640	escherichia coli	17	2			28	W/kg	1	30	no effect on colony survival and chromosome damage	4	1503
641	escherichia coli	70	2			9	W/kg	1	30	no effect on colony survival and chromosome damage	4	1503
642	escherichia coli	8.8	3			12	W/kg	1	900	no change in growth when compared to temperature controls	4	3340
643	saccharomyces cerevisiae	41	2	10	W/m/m	4	W/kg	1	660	change in growth rate that was very frequency specific, indicating an alteration in the process of the cell	4	3277
644	saccharomyces cerevisiae	42	2	30	W/m/m	11	W/kg	1	660	change in growth rate that was very frequency specific, indicating an alteration in the process of the cell	4	3277
645	mouse	2.45	2	1000	W/m/m	11.4	W/kg	1	10	higher mutagencity index perhaps due to heating and RF	4	3684
646	mouse	2.45	2	500	W/m/m	5.7	W/kg	3	10	higher mutagencity index perhaps due to heating and RF	4	3684
647	mouse	1.7	2	100	W/m/m	0.5	W/kg	1	80	higher mutagencity index perhaps due to heating and RF	4	3682
648	rabbit	5.5	2	4700	W/m/m	300	W/kg	1	2	cataract	14	3082
649	rabbit	5.5	2	7850	W/m/m	500	W/kg	1	100	cataract	14	3082
650	rabbit	5.5	3	4700	W/m/m	300	W/kg	1	2	cataract	14	3082
651	rabbit	5.5	3	7850	W/m/m	500	W/kg	1	100	cataract	14	3082
652	rabbit	0.8	2	7850	W/m/m	500	W/kg	1	25	cataract	14	3083
653	rabbit	4.2	3	7850	W/m/m	500	W/kg	1	17	cataract	14	3083
654	rabbit	4.6	3	7850	W/m/m	500	W/kg	1	15	cataract	14	3083
655	rabbit	5.2	3	5000	W/m/m	350	W/kg	1	5	cataract	14	3083
656	rabbit	5.2	3	7850	W/m/m	500	W/kg	1	12	cataract	14	3083
657	rabbit	5.4	2	7850	W/m/m	500	W/kg	1	4	cataract	14	3083
658	rabbit	5.2	2	5000	W/m/m	300	W/kg	1	3	cataract	14	3083
659	rabbit	5.4	3	7850	W/m/m	500	W/kg	1	4	cataract	14	3083
660	rabbit	5.2	3	5000	W/m/m	300	W/kg	1	3	cataract	14	3083
661	rabbit	5.5	2	5000	W/m/m	300	W/kg	1	2	cataract	14	3083
662	rabbit	5.5	2	7850	W/m/m	500	W/kg	1	3	cataract	14	3083
663	rabbit	5.5	3	5000	W/m/m	300	W/kg	1	2	cataract	14	3083
664	rabbit	5.5	3	7850	W/m/m	500	W/kg	1	3	cataract	14	3083
665	rabbit	6.3	3	7850	W/m/m	500	W/kg	1	5	cataract	14	3083

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
666	rabbit	2.45	2	1800	W/m/m			1	240	cataract and other ocular effects	14	3116
667	rabbit	2.45	2	1200	W/m/m			20	60	cataract and other ocular effects	14	3116
668	rabbit	2.45	2	1800	W/m/m			20	60	cataract and other ocular effects	14	3116
669	rabbit	2.45	2	750	W/m/m			20	60	no cataract	14	3116
670	rabbit	2.45	2	1500	W/m/m	138	W/kg	1	100	cataract	14	3290
671	rabbit	2.45	2	2950	W/m/m			1	30	cataract	14	3299
672	rabbit	10	2	3750	W/m/m			1	30	cataract	14	3299
673	rabbit	2.45	2	1800	W/m/m	100	W/kg	1	140	cataract and other ocular effects	14	3397
674	monkey (rhesus)	2.45	2	3000	W/m/m	115	W/kg	1	22	second- to third-degree nasal burns; no ocular effects	14	3397
675	rabbit	35	2	400	W/m/m	175	W/kg	1	60	no cataract; keratitis (inflammation of cornea)	14	3533
676	rabbit	107	2	400	W/m/m	238	W/kg	1	60	no cataract; keratitis (inflammation of cornea)	14	3533
677	rabbit	3	2	1000	W/m/m	14	W/kg	1	15	no ocular effects, including no lenticular changes	14	3037
678	rabbit	3	2	2000	W/m/m	28	W/kg	1	30	no ocular effects, including no lenticular changes	14	3037
679	rabbit	3	2	3000	W/m/m	42	W/kg	1	15	acute ocular changes, e.g., hyperemia of lids and conjunctiva, meiosis, anterior chamber flare, engorgement of iris vessels, and periorbital cutaneous burns; no lenticular changes.	14	3037
680	rabbit	3	2	4000	W/m/m	56	W/kg	1	15	acute ocular changes, e.g., hyperemia of lids and conjunctiva, meiosis, anterior chamber flare, engorgement of iris vessels, and periorbital cutaneous burns; no lenticular changes.	14	3037
681	rabbit	3	2	5000	W/m/m	70	W/kg	1	15	death	14	3037
682	rabbit	3	2	3000	W/m/m	42	W/kg	1	30	death	14	3037
683	rabbit	0.385	2	600	W/m/m	48	W/kg	10	15	no catarats	14	3151
684	rabbit	0.385	2	300	W/m/m	24	W/kg	10	90	no catarats	14	3151
685	rabbit	0.468	2	600	W/m/m	8.1	W/kg	10	20	no catarats	14	3151
686	rabbit	2.45	2	100	W/m/m	1.5	W/kg	65	480	no catarats	14	3218
687	rabbit	2.45	2	100	W/m/m	17	W/kg	180	1380	no ocular effects	14	3298
688	monkey (macaca mulatta)	9.31	3	1500	W/m/m			35	480	no ocular effects	14	3449
689	human	3		0.06	W/m/m					RF hearing "distinct" clicks	14	3110
690	human	3		0.055	W/m/m					RF hearing "distinct" clicks	14	3110

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
691	human	3		0.045	W/m/m					RF hearing "distinct" clicks	14	3110
692	human	3		50	W/m/m					RF hearing: buzz heard at pulse repetition rates > 100; individual pulses heard at pulse repetition rates < 100	14	3153
693	human	6.5		50	W/m/m					RF hearing: buzz heard at pulse repetition rates > 100; individual pulses heard at pulse repetition rates < 100	14	3153
694	human	9.5								no auditory response	14	3153
695	human	1.245		1.9	W/m/m					RF hearing "buzzing sound"	14	3230
696	human	1.245		3.2	W/m/m					RF hearing "buzzing sound"	14	3230
697	human	0.216		40	W/m/m					RF hearing "buzz, clicking, hiss, or knocking"	14	3226
698	human	0.425		10	W/m/m					RF hearing "buzz, clicking, hiss, or knocking"	14	3226
699	human	0.425		19	W/m/m					RF hearing "buzz, clicking, hiss, or knocking"	14	3226
700	human	0.425		32	W/m/m					RF hearing "buzz, clicking, hiss, or knocking"	14	3226
701	human	0.425		71	W/m/m					RF hearing "buzz, clicking, hiss, or knocking"	14	3226
702	human	8.9		250	W/m/m					no auditory response	14	3225
703	human	1.31		4	W/m/m					RF hearing "buzzing sound"	14	3224
704	human	2.982		20	W/m/m					RF hearing "buzzing sound"	14	3224
705	human	2.45		1	W/m/m					RF hearing "clicks, chirps"	14	3291
706	human	0.8		1	W/m/m					RF hearing	14	3678
707	cat	3								response obtained with scalp electrodes	14	3110
708	cat	3								response obtained with scalp electrodes	14	3110
709	cat	3								response obtained with scalp electrodes	14	3110
710	guinea pig	0.918								response obtained from round window with carbon lead	14	3138
711	guinea pig	0.918								response obtained with carbon-loaded teflon electrodes	14	3137
712	cat	0.918								response obtained from medial geniculate with glass electrode	14	3291
713	cat	2.45								response obtained from medial geniculate with glass electrode	14	3291
714	cat	9.92								response obtained from medial geniculate with glass electrode	14	3291
715	cat	0.915								response obtained from individual auditory neurons with glass electrode	14	3403
716	human	3	3			20	W/kg	1	0.017	sensation of warmth on forehead	14	3323
717	human	3	3			40	W/kg	1	0.083	sensation of warmth on forehead	14	3323
718	human	10	3			25	W/kg	1	0.017	sensation of warmth on forehead	14	3324

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
719	human	10	3			35	W/kg	1	0.083	sensation of warmth on forehead	14	3324
720	human	2.88		740	W/m/m			1	0.73	sensation of warmth on forehead	14	3589
721	human	2.88		560	W/m/m			1	1.92	sensation of warmth on forehead	14	3589
722	human	2.45	2	267	W/m/m			1	0.17	sensation of warmth on inner forearm	14	3370
723	human	3	3	14000	W/m/m			1	0.1	sensation of warmth on inner forearm	14	3685
724	human	3	3	25000	W/m/m	2000	W/kg	1	0.5	sensation of pain on inner forearm	14	3154
725	human	3	3	10000	W/m/m	2000	W/kg	1	2.17	sensation of pain on inner forearm	14	3154
726	brain tissue (chicken)	0.147		15	W/m/m	0.002	W/kg	1	20	the frequency specificity altered calcium-ion efflux in brain tissue in vitro	2	3067
727	brain tissue (chicken)	0.45		7.5	W/m/m	0.0035	W/kg	1	20	the pH value and lanthanum altered calcium-ion efflux in brain tissue in vitro	2	3068
728	brain tissue (chicken)	0.147		8.3	W/m/m	0.0014	W/kg	1	20	the frequency and intensity specificity altered calcium-ion efflux in brain tissue in vitro	2	3088
729	brain tissue (chicken)	0.147		8.3	W/m/m	0.0014	W/kg	1	20	the intensity specificity and sample spacing altered calcium-ion efflux in brain tissue in vitro	2	3089
730	brain tissue (chicken)	0.45		1	W/m/m	0.0005	W/kg	1	20	the intensity specificity altered calcium-ion efflux in brain tissue in vitro	2	3602
731	brain tissue (chicken)	0.45		10	W/m/m	0.005	W/kg	1	20	the intensity specificity altered calcium-ion efflux in brain tissue in vitro	2	3602
732	brain tissue (chicken)	0.05		15	W/m/m	0.0013	W/kg	1	20	the two intensity ranges altered calcium-ion efflux in brain tissue in vitro	2	3090
733	brain tissue (chicken)	0.05		36	W/m/m	0.0035	W/kg	1	20	the two intensity ranges altered calcium-ion efflux in brain tissue in vitro	2	3090
734	brain tissue (rat)	1	3	5	W/m/m	0.15	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vitro for pulse modulation	2	3601
735	brain tissue (rat)	1	3	15	W/m/m	4.35	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vitro for pulse modulation	2	3601
736	brain tissue (rat)	1	3	10	W/m/m	0.29	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vitro for pulse modulation	2	3461
737	brain tissue (rat)	1	3	100	W/m/m	2.9	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vitro for pulse modulation	2	3461
738	brain tissue (rat)	2.45	3	10	W/m/m	0.3	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vitro for pulse modulation	2	3461
739	brain tissue (rat)	0.45	1	5	W/m/m			1	10	only 16 Hz modulation affected the efflux kinetics of calcium ions	2	3423
740	brain tissue (human)	0.915				0.05	W/kg	1	30	the frequency and intensity specificity altered calcium-ion efflux in cultured neuroblastoma cells	2	3198
741	brain tissue (rat)	2.06	3	5	W/m/m	0.12	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vivo for pulse modulation	2	3461
742	brain tissue (rat)	2.06	3	100	W/m/m	2.4	W/kg	1	20	no effect calcium-ion efflux in brain tissue in vivo for pulse modulation	2	3461

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
743	brain tissue (cat)	0.45	1	30	W/m/m	0.29	W/kg	1	60	effect calcium-ion efflux kinetics in brain tissue in vivo from awake animal	2	3011
744	chicken	0.45	4	10	W/m/m	0.2	W/kg	1	23	no change in behavior	1	3570
745	chicken	0.45	4	50	W/m/m	1	W/kg	1	23	no change in behavior	1	3570
746	mouse	0.45		15	W/m/m			1	120	suppressed T-lymphocyte activity	7	3436
747	pancreatic tissue (rat)	0.147		20	W/m/m	0.075	W/kg	1	105	increase of calcium-ion efflux	2	3020
748	human (adult)	3.33		0.05	W/m/m	0.0002	W/kg	8030	600	no effect on life span or cause of death	9	3412
749	human (adult)	5.05		0.18	W/m/m	0.0007	W/kg	180	1200	no effect on life span or cause of death	9	3412
750	human (adult, male)	2.6	3	10	W/m/m	0.05	W/kg	730	480	no effect on on mortality in a military population followed for 20 years	9	3551
751	human (adult, male)	2.6	3	1000	W/m/m	5	W/kg	730	480	no effect on on mortality in a military population followed for 20 years	9	3551
752	mouse (adult)	0.8		430	W/m/m	12.9	W/kg	175	120	slight increase in mean life span	9	1419
753	mouse (infant)	2.45	2			35	W/kg	4	20	increased mean and maximum life span for "irradiated mice with tumors". increased mean life span but no change in maximum life span of non-tumor-bearing mice. delay in development of tumors in irradiate mice but no change in ultimate number of tumors	9	1095
754	mouse (adult)	9.27	3	1000	W/m/m	40	W/kg	295	4.5	increased mean life span in irradiated mice (concurrent infection-pneumonia)	9	3527
755	human (adult, male)	0.4	3	40	W/m/m	0.16	W/kg	1625	480	no significant change in health status of exposed personnel	9	3057
756	human (adult, male)	2.88	3	40	W/m/m	0.12	W/kg	1625	480	no significant change in health status of exposed personnel	9	3057
757	human (adult, male)	9.375	3	40	W/m/m	0.12	W/kg	1625	480	no significant change in health status of exposed personnel	9	3057
758	human (adult, male)	0.4	3	40	W/m/m	0.16	W/kg	1625	480	no significant change in health status of exposed personnel	9	3058
759	human (adult, male)	2.88	3	40	W/m/m	0.12	W/kg	1625	480	no significant change in health status of exposed personnel	9	3058
760	human (adult, male)	9.375	3	40	W/m/m	0.12	W/kg	1625	480	no significant change in health status of exposed personnel	9	3058
761	human (adult, male)	9.375	3	2	W/m/m	0.008	W/kg	1375	480	no differences in three major diagnostic categories between the two groups of microwave workers	9	3161
762	human (adult, male)	9.375	3	2	W/m/m	0.008	W/kg	1375	480	no differences in three major diagnostic categories between the two groups of microwave workers	9	3607

DATABASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	Species	Frequency	Type	Intensity	Unit	SAR	Unit	Days	Minutes	Effects	Category	Reference Index
763	human (adult, male)	9.375	3	2	W/m/m	0.008	W/kg	1375	480	no differences in three major diagnostic categories between the two groups of microwave workers	9	3608
764	human (adult, male)	9.375	3	50	W/m/m	0.2	W/kg	1875	480	no differences observed in clinical evaluations; more subjective complain in exposed group	9	3188
765	human (adult)	3.33	3	0.05	W/m/m	0.0002	W/kg	5500	480	no effect on life span or cause of death	9	3412
766	human (adult)	5.05	3	0.18	W/m/m	0.0007	W/kg	125	480	no effect on life span or cause of death	9	3412
767	human (adult, male)	2.6	3	10	W/m/m	0.05	W/kg	500	480	no effect on mortality in a military population followed for more than 20 years	9	3551
768	human (adult, male)	6.8	3	0.055	W/m/m	0.0035	W/kg	2000	480	decreased number of sperm/ml of ejaculate; reduced percentages of normal and motile sperm in ejaculate	9	3551

Frequency: Frequency of electromagnetic waves in GHz

Type: 1 = Amplitude Modulation (AM). 2 = Continue Wave (CW), 3 = Pulse Wave (PW), 4 = Sine Wave (SW), 5 = Frequency Modulation (FM)

Category: 1 = Behavior, 2 = Biochemical, 3 = Cardiac, 4 = Genetic, 5 = Growth, 6 = Health, 7 = Hematologic, 8 = Immunologic, 9 = Life Span, 10 = Metabolism, 11 = Molecular, 12 = Nervous, 13 = Neuroendocrine, 14 = Senses, 15 = Teratogenesis, 16 = Testes

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1026	Yao, K. T. S.	Cytogenetic consequences of microwave irradiation on mammalian cells incubated in vitro	J. Heredity, 73, 133	1982	1	26
1027	Huang, A. T., Engle, M. E., Elder, J. A., Kinn, J. B., and Ward, T. R.	The effect of microwave radiation (2450 MHz) on the morphology and chromosomes of lymphocytes	Radio Sci., 12(6S), 173	1977	1	27
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3067	Bawin, S.M., L.K. Kaczmarek, and W.R. Adey	Effects of Modulated VHF Fields on the Central Nervous System	Ann. N.Y. Acad. Sci., 247:74-81	1975	3	67
3068	Bawin, S.M., W.R. Adey, and I.M. Sabbot	Ionic Factors in Release of 45Ca2+. From Chicken Cerebral Tissue by Electromagnetic Fields	Proc. Natl. Acad. Sci. USA, 75:6314-6318	1978	3	68
3082	Birenbaum, L., G.M. Grosof, S.W. Rosenthal, and M.M. Zaret	Effect of Microwaves on the Eye	IEEE Trans. Biomed. Eng., BME-16:7-14	1969	3	82

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Reference Index	Authors	Titles	Journal	Year	Source	Reference
3083	Birenbaum, L., I.T. Kaplan, W. Metlay, S.W. Rosenthal, H. Schmidt, and M.M. Zaret	Effect of Microwaves on the Rabbit Eye	J. Microwave Power, 4:232-243	1969	3	83
3088	Blackman. C.F., J.A. Elder, C.M. Weil. S.G. Benane, D.C. Eichinger, and D.E. House	Induction of Calcium-Ion Efflux from Brain Tissue by Radiofrequency Radiation: Effects of Modulation Frequency and Field Strength	Radio Sci., 14(6S):93-98	1979	3	88
3089	Blackman, C.F., S.G. Benane, J.A. Elder, D.E. House, J.A. Lampe, and J. M. Faulk	Induction of Calcium-Ion Efflux from Brain Tissue by Radiofrequency Radiation: Effect of Sample Number and Modulation Frequency on the Power-Density Window	Bioelectromagnetics, 1:35-43	1980	3	89
3090	Blackman, C.F., S.G. Benane, W.T. Joines, M.A. Hollis, and D.E. House	Calcium-Ion Efflux from Brain Tissue: Power-Density Versus Internal Field-Intensity Dependencies at 50 MHz RF Radiation	Bioelectromagnetics, 1:277-283	1980	3	90
3110	Cain. C.A., and W.J. Rissmann	Mammalian Auditory Responses to 3.0 GHz Microwave Pulses	IEEE Trans. Biomed. Eng., BME-25:288-293	1978	3	110
3116	Carpenter, R.L.	Ocular Effects of Microwave Radiation	Bull. N.Y. Acad. Med., 55:1048-1057	1979	3	116
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3137	Chou, C.K., and A.W. Guy	Microwave-Induced Auditory Responses in Guinea Pigs. Relationship of Threshold and Microwave-Pulse Duration	Radio Sci., 14(6S):193-197	1979	3	137
3138	Chou, C.K., R. Galambos, A.W. Guy, and R.H. Lovely	Cochlear Microphonics Generated by Microwave Pulses	J. Microwave Power, 10:361-367	1975	3	138
3151	Cogan, D.G., S.J. Fricker, M. Lubin, D.D. Donaldson, and H. Hardy	Cataracts and Ultra-High-Frequency Radiation	A.M.A. Arch. Ind. Health, 18:299-302	1958	3	151
3153	Constant, P.C., Jr.	Hearing EM Waves	Digest of the Seventh International Conference on Medical and Biological Engineering, B. Jacobson, ed. Department of Medical Engineering, Karolinska Institute, Stockholm, Sweden. p. 349	1967	3	153
3154	Cook, H.F.	The Pain Threshold for Microwave and Infra-Red Radiations	J. Physiol. 118:1-11	1952	3	154
3161	Czerski, P., M. Sierkierzynski, and A. Gidynski	Health Surveillance of Personnel Occupationally Exposed to Microwaves. I. Theoretical Considerations and Practical Aspects	Aerospace Med., 45:1137-1142	1974	3	161
3188	Djordjevic. Z., A. Kolak. M. Stojkovic, N. Rankovic, and P. Ristic	A Study of the Health Status of Radar Workers	Aviat. Space Environ. Med., 50:396-398	1979	3	188
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Reference Index	Authors	Titles	Journal	Year	Source	Reference
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3225	Frey, A.H.	Human Auditory System Response to Modulated Electromagnetic Energy	J. Appl. Physiol., 17:689-692	1962	3	225
3226	Frey, A.H.	Some Effects on Human Subjects of Ultra-High-Frequency Radiation	Am. J. Med. Electron., 2:28-31	1963	3	226
3230	Frey, A.H., and R. Messenger	Human Perception of Illumination with Pulsed Ultrahigh-Frequency Electromagnetic Energy	Science, 181:356-358	1973	3	230
3277	Grundler, W., F. Keilmann, and H. Frohlich	Resonant Growth Rate Response of Yeast Cells Irradiated by Weak Microwaves	Phys. Lett. 62A:463-466	1977	3	277
3290	Guy, A.W., J.C. Lin, P.O. Kramar, and A.F. Emery	Effect of 2450-MHz Radiation on the Rabbit Eye	IEEE Trans. Microwave Theory Techniques. MTT-23:492-498	1975	3	290
3291	Guy. A.W., C.K. Chou, J.C. Lin, and D. Christensen	Microwave-Induced Acoustic Effects in Mammalian Auditory Systems and Physical Materials	Ann. N.Y. Acad. Sci.: 247:194-215	1975	3	291
3298	Guy. A.W., P.O. Kramar, C.A. Harris, and C.K. Chou	Long-Term 2450-MHz CW Microwave Irradiation of Rabbits: Methodology and Evaluation of Ocular and Physiologic Effects	J. Microwave Power, 15:37-44	1980	3	298
3299	Hagan, G.J., and R.L. Carpenter	Relative Cataractogenic Potencies of Two Microwave Frequencies (2.45 and 10 GHz)	Biological Effects of Electromagnetic Waves, Vol. I, C.C. Johnson and M.L. Shore, eds. HEW Publication (FDA) 77-8010, Rockville, Maryland. pp. 143-155	1976	3	299
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3323	Hendler, E.	Cutaneous Receptor Response to Microwave Irradiation.	Thermal Problems in Aerospace Medicine, J.D. Hardy, ed. Technivision Services, Maidenhead, England. pp. 149-161	1968	3	323
3324	Hendler, E., J.D. Hardy, and D. Murgatroyd	Skin Heating and Temperature Sensation Produced by Infra Red and Microwave Irradiation	Temperature: Its Measurement and Control in Science and Industry. Part 3. Biology and Medicine, C.M. Herzfeld, ed. Reinhold, New York, New York. pp. 211-230	1963	3	324
3340	Hossain, M., and S.K. Dutta	Comparison of Bacterial Growth to High-Intensity Microwave Exposure and Conventional Heating	Bioelectromagnetics, 3:471-474	1982	3	340
3370	Justesen, D.R., E.R. Adair, J.C. Stevens, and V. Bruce-Wolfe	A Comparative Study of Human Sensory Thresholds: 2450-MHz Microwaves vs Far-Infrared Radiation	Bioelectromagnetics, 3:117-125	1982	3	370
3397	Kramer, P., C. Harris, A.F. Emery, and A.W. Guy	Acute Microwave Irradiation and Cataract Formation in Rabbits and Monkeys	J. Microwave Power, 13:239-249	1978	3	397

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Reference Index	Authors	Titles	Journal	Year	Source	Reference
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3412	Lilienfeld, A.M., J. Tonascia, S. Tonascia, C.A. Libauer, and G.M. Cauthen	Foreign Service Health Status Study-Evaluation of Health Status of Foreign Service and Other Employees from Selected Eastern European Posts	Final Report, Contract No. 6025-619073 (NTIS PB-288163), Dept. of State, Washington, D.C. 436 pp.	1978	3	412
3423	Lin-Liu, S., and W.R. Adey	Low Frequency Amplitude Modulated Microwave Fields Change Calcium Efflux Rates from Synaptosomes	Bioelectromagnetics, 3:309-322	1982	3	423
3436	Lyle, D.B., P. Schechter. W.R. Adey, and R.L. Lundak	Suppression of T-Lymphocyte Cytotoxicity Following Exposure to Sinusoidally Amplitude-Modulated Fields	Bioelectromagnetics, 4:281-292	1983	3	436
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3461	Merritt, J.H., W.W. Shelton, and A.F. Chamness	Attempts to Alter 45CA2+ Binding to Brain Tissue with Pulse-Modulated Microwave Energy	Bioelectromagnetics. 3:475-478	1982	3	461
3512	Pay, T.L., F.A. Andersen, and G.L Jessup, Jr.	A Comparative Study of the Effects of Microwave Radiation and Conventional Heating on the Reproductive Capacity of Drosophila melanogaster	Radiat. Res., 76:271-282	1978	3	512
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3551	Robinette, C.D., C. Silverman, and S. Jablon	Effects upon Health of Occupational Exposure to Microwave Radiation (Radar)	Am. J. Epidemiol., 112:39-53	1980	3	551
3570	Sagan, P.M., and R.G. Medici	Behavior of Chicks Exposed to Low-Power 450-MHz Fields Sinusoidally Modulated at EEG Frequencies	Radio Sci., 14(6S):239-245	1979	3	570
3589	Schwarz, H.P., A. Anne, and L. Sher	Heating of Living Tissues	Report NAEC-ACEL-534, U.S. Naval Air Engineering Center, Philadelphia, Pennsylvania. 30 pp.	1966	3	589
3601	Shelton, W.W., Jr., and J.H. Merritt	In Vitro Study of Microwave Effects on Calcium Efflux in Rat Brain Tissue	Bioelectromagnetics, 2:161-167	1981	3	601
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Reference Index	Authors	Titles	Journal	Year	Source	Reference
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3621	Smialowicz, R.J., R.R. Rogers, R.J. Garner, M.M. Riddle, R.W. Luebke, and D.G. Rowe	Microwaves (2450-MHz) Suppress Murine Natural Killer Cell Activity	Bioelectromagnetics, 4:371-381	1983	3	621
3664	Taylor, E.M., and B.T. Ashleman	Some Effects of Electromagnetic Radiation on the Brain and Spinal Cord of Cats	Ann. N.Y. Acad. Sci., 247:63-73	1975	3	664
3678	Tyazhelov, V.V., R.E. Tigranian, E.O. Khizhniak, and I.G. Akoev	Some Peculiarities of Auditory Sensations Evoked by Pulsed Microwave Fields	Radio Sci., 14(6S):259-263	1979	3	678
3682	Varma, M.M., and E.A. Traboulay, Jr.	Evaluation of Dominant Lethal Test and DNA Studies in Measuring Mutagenicity Caused by Non-Ionizing Radiation	Biological Effects of Electromagnetic Waves, Vol. I, C.C. Johnson and M.L. Shore. eds. HEW Publication (FDA) 77-8010, Rockville, Maryland. pp. 386-396	1976	3	682
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3685	Vendrik, A.J.H., and J.J. Vos	Comparison of the Stimulation of the Warmth Sense Organ by Microwave and Infrared	J. Appl. Physiol., 13:435-444	1958	3	685

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2 = "Radiofrequency Radiation and Teratogensis: a Comprehensive Review of the Literature Pertinent to Air Force Operations", by Louis N. Heynick and Peter Polson, Final Technical Report for Armstrong Laboratory, AL/OE-TR-1996-0036, June, 1996

3 = "Biological Effects of Radiofrequency Radiation", by Daniel F. Cahill and Joe A. Elder, Final Report, EPA-600/8-83-026F, September 1984

REMARKS

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
188	this was primarily a study of mother-infant behavior, and of EEGs. because of autolsis, the cause of the infant deaths could not be determined. this was also reported in table 15I in source #2 (reference #64)
193	this was also reported in table 15A of source #2. In source #2, the SAR was not determined and the intensity were in different units. the mice were 4-day-old and test up to age 21 days. duration and duty cycle of pulse power were not stated
194	this was also reported in table 15A of source #2. In source #2, the SAR was not determined and the intensity were in different units the mice were 4-day-old and test up to age 21 days. duration and duty cycle of pulse power were not stated
195	this was also reported in table 15A of source #2. In source #2, the SAR was not determined and the intensity were in different units the mice were 4-day-old and test up to age 21 days; the power were 8 kV/m and 55 A/m and the two field were parallel (vertical) in coincident planes
205	this was reported in table 9 chapter 11 of source #1 (reference #150). in source #1, the SAR were 85-112 W/kg and no intensity data
206	this was reported in table 9 chapter 11 of source #1 (reference #150). in source #1, the SAR were 85-112 W/kg and no intensity data
207	this was reported in table 9 chapter 11 of source #1 (reference #151). in source #1, the SAR were 85-112 W/kg and no intensity data
208	this was reported in table 9 chapter 11 of source #1 (reference #151). in source #1, the SAR were 85-112 W/kg and no intensity data
209	this was reported in table 15A of source #2 (reference #19).
210	this was also report in table 15D of source #2 (reference #20). effects were clearly thermal, but validity of the findings may be questioned because of the small numbers of rats studies (recognized by the authors), which necessitated averaging the data in each group over the 10- to 17-day gestation period.
212	this was reported in table 8b of source #2 (reference #45)
218	this was also report in table 15D of source #2 (reference #97). this study was primarily on seeking immunologic and hematologic effects. the SAR range was 4.7 - 0.7 W/kg, represented the decrease of mean SAR with increase in mean weight (with age) rather than variation among animals at any time. the paper also reported the immunologic, hematologic, and teratogentic effects
219	this was also report in table 15D of source #2 (reference #6).
225	this was also report in table 15D of source #2 (reference #95). source #2 was indicated that the SAR was not determined in paper. selected one pup from each litter on past-partum days 2 - 15 to determine body and brain weights.
556	the results are difficult to analyze because of the large spatial range of RFR levels and the likelihood of larger internal temperature gradients than within sham-exosed eggs (clarke and Justesen, 1983)
557	this study suffers from faulty expserimental-design and methodology; little if any credence can be given to its positive or negative findings
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559	inadequate control of the temperatures during RFR-exposure and the spatial gradient within the exposure chamber are major flaws in an otherwise well designed study
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REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
562	in the absence of information on exposure methodology or dosimetry, as well as other details about spatial ambient-temperature uniformity within the exposure chamber, egg-turning arrangement and scheduling, and the like, little credence can be given to any findings of this study
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567	in the absence of information on exposure methodology or dosimetry, as well as other details about spatial ambient-temperature uniformity within the exposure chamber, egg-turning arrangement and scheduling, and the like, little credence can be given to any findings of this study
572	power is 59.5 and 2.12 w/cm2
573	power is 29.8 and 1.06 W/cm2
574	power is 59.5 and 2.12 w/cm2
575	power is 29.8 and 1.06 W/cm2
576	this was also reported in table 15A of source #2. In source #2, the SAR was not determined and the intensity were in different units the mice were 4-day-old and test up to age 21 days. duration and duty cycle of pulse power were not stated
577	brain assays were done after brain-enzyme inactivation with high-intensity RFR of short (300 msec) duration.
578	10 of 103 RFR-exposed litters had 1 or more abnormal fetuses versus 2 of 117 sham-exposed litters. the validity of the statistical treatment was questioned.
579	7 of 109 RFR-exposed litters had 1 or more abnormal fetuses versus 7 of 106 sham-exposed litters. the validity of the statistical treatment was questioned.
580	5 of 62 RFR-exposed litters had 1 or more abnormal fetuses versus 1 of 73 sham-exposed litters. the validity of the statistical treatment was questioned.
581	5 of 44 RFR-exposed litters had 1 or more abnormal fetuses versus 2 of 40 sham-exposed litters. the validity of the statistical treatment was questioned.
582	5 of 44 RFR-exposed litters had 1 or more abnormal fetuses versus 2 of 40 sham-exposed litters. the validity of the statistical treatment was questioned.
583	5 of 44 RFR-exposed litters had 1 or more abnormal fetuses versus 2 of 40 sham-exposed litters. the validity of the statistical treatment was questioned.
584	comment by authors: hamster fetus may be more susceptible to RFR than the mouse.
585	comment by authors: hamster fetus may be more susceptible to RFR than the mouse.
588	the rectal temperature was raised about 1.0 degree C. the handling was an important factor, but heating was as well.
589	the rectal temperature was raised about 2.3 degree C.

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
590	the rectal temperature was raised about 2.3 degree C.
593	the negative results were consonant with the approximately 300 W/m/m threshold found by Nawrot ett al. (1981). rectal temperature rises was 0.0 degree C
594	the negative results were consonant with the approximately 300 W/m/m threshold found by Nawrot ett al. (1981). rectal temperature rises was 1.0 degree C
595	the half pups of RFR-exposed pregnant mice were exposed to RFR (rr group), the other half were sham-exposed (rc group). the half pups of sham-exposed pregnant mice were exposed to RFR (cr group), and the other half were sham-exposed (cc group)
596	they correlated with rectal temperature, showing that the effects were due to heating by RFR. in a separate experiment, heating of tumors to 42 degree C with 461 MHz RFR was found to lower the DNA-synthesis rate more effectively than tumor treatment with X-rays.
598	the SAR range was 11.1 - 12.5 W/kg. the power were 27.12 MHz concurrent CW manetic and electric fields at 55 A/m and 300 V/m in a near-field synthesizer at 23 degree C ambient temperature and 45% relative humidity.
599	treated on gestation day 9, treament groups were: 1) 14 - 22 min. to attain colonic temperature 41.0 degree C, 2) held at 41 degree C for additational 2 hours, 3) 13 - 33 min. to reach 42.0 degree C, 4) held at 42.0 degree C for additional 15.0 min.
600	endpoints inclued colonic-temperature, number of litters, mean implantations per litter, percentages of dead or resorbed implantations or percentages of live fetuses with major skeletal abnormalities, fetal mean weight, crown-rump length, and sex ratio
601	treated on gestation day 9. the power were 27.12 MHz concurrent CW manetic and electric fields at 55 A/m and 300 V/m.
603	brain SARs for the pups mostly decreased with age; the mean value were: 13.95 W/kg in 2-day-old (~10.0 g) pups, 19.18 W/kg in 15-day-old (~30.0 g) pups, 10.05 W/kg in 20-day-old (~50.0 g) pups, 9.72 W/kg in 30-day-old (~100.0 g) pups, and 9.52 W/kg in 40-day-old (~160.0 g) pups,
604	power: 27.12 MHz RFR at field strengths 20 V/m and 0.05 A/m.
605	the SARs were determined with saline phantoms. not clear is why the two diathermy units yielded such differences with the same applicatior. the finding were questionable, especially because with the erbr, only 1 of 86 embryos exposed for 30 min. and none of 49 of embryos exposed for 45 min or 39 embryos for 60 min. exhibited abnormalities. the presence of uncontrolled non-RFR factors was likely.
606	the SARs were determined with saline phantoms. not clear is why the two diathermy units yielded such differences with the same applicatior. the finding were questionable, especially because with the erbr, only 1 of 86 embryos exposed for 30 min. and none of 49 of embryos exposed for 45 min or 39 embryos for 60 min. exhibited abnormalities. the presence of uncontrolled non-RFR factors was likely.
607	the SARs were determined with saline phantoms. not clear is why the two diathermy units yielded such differences with the same applicatior. the finding were questionable, especially because with the erbr, only 1 of 86 embryos exposed for 30 min. and none of 49 of embryos exposed for 45 min or 39 embryos for 60 min. exhibited abnormalities. the presence of uncontrolled non-RFR factors was likely.
608	power: 33.0 kV/m and 0.8 A/m. Durations chosen to raise and hold core temperatures by 2.5, 3.0, 3.5, 4.0, 4.5, or 5.0 degree C.
609	power: 450 V/m and 0.1 A/m. in the absence data, it is difficult to ascribe the differences seen in breeding behavior and pregnancy outcome to the RFR without independent verification.
610	this was also reported in table 9 of source #1 (reference #166). no days and minutes reported in source #1, different intensity and SAR values were repoeted in source #1.
611	this was a companion study to Jensh et al. (1982a), directed primarily toward seeking behavioral effects.
612	the endpoints: mean maternal weight gain during pregnancy, term maternal organ weights (brain, liver, kidneys, ovaries), term fetal weight, resorption rate, and abnormality rate.

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
613	the endpoints: mean maternal weight gain during pregnancy, term maternal organ weights (brain, liver, kidneys, ovaries), term fetal weight, resorption rate, and abnormality rate.
614	teratogenic effects at 6 GHz may not be expected, because the penetration depth in muscle (0.7 cm) is much smaller than at 24.5 GHz (1.7 cm) or 915 MHz (2.4 cm), so local SARs in the uteri may have been much lower than at 6 GHz even though the whole-body SARs were much higher than in the earlier studies.
615	this was a companion study to Jensh (1984a), directed primarily toward seeking immunologic effects.
616	power absorption was determined from measurements of forward, reflected, and transmitted powers without and with the rat present.
617	power: 1.5 and 2.45 GHz of CW and PW
618	power: 1.5 and 2.45 GHz of CW and PW
633	duration: 2 or 9 x 90
689	threshold values; pulse repetition rates (s-1) = 0.5; pulse width = 0.005 ms; peak intensity = 25000 W/m2; average intensity = 0.06 W/m2; energy pulse = 0.125 J/m2; noise levels = 45 dB + plastic foam ear muffs
690	threshold values; pulse repetition rates (s-1) = 0.5; pulse width = 0.01 ms; peak intensity = 2250-20000 W/m2; average intensity = 0.01-0.1 W/m2; energy pulse = 0.023-0.2 J/m2; noise levels = 45 dB + plastic foam ear muffs
691	threshold values; pulse repetition rates (s-1) = 0.5; pulse width = 0.015 ms; peak intensity = 3000-10000 W/m2; average intensity = 0.02-0.07 W/m2; energy pulse = 0.045-0.15 J/m2; noise levels = 45 dB + plastic foam ear muffs
692	pulse repetition rates (s-1) <100-1000; pulse width = 0.001-0.002 ms; peak intensity = 25000-500000 W/m2; average intensity = 50 W/m2; energy pulse = 0.4 J/m2
693	pulse repetition rates (s-1) <100-1000; pulse width = 0.001-0.002 ms; peak intensity = 25000-500000 W/m2; average intensity = 50 W/m2
694	pulse width = 0.0005 ms
695	pulse repetition rates (s-1) = 50; pulse width = 0.01 ms; peak intensity = 3700 W/m2; average intensity = 1.9 W/m2
696	pulse repetition rates (s-1) = 50; pulse width = 0.07 ms; peak intensity = 900 W/m2; average intensity = 3.2 W/m2
697	threshold values; peak intensity = 6700 W/m2; average intensity = 40 W/m2, noise level = 70-90 dB + ear stopples
698	threshold values; pulse repetition rates (s-1) = 27; pulse width = 0.125 ms; peak intensity = 2630 W/m2; average intensity = 10 W/m2; noise levels = 70-90 dB + ear stopples
699	threshold values; pulse repetition rates (s-1) = 27; pulse width = 0.25 ms; peak intensity = 2710 W/m2; average intensity = 19 W/m2; noise levels = 70-90 dB + ear stopples
700	threshold values; pulse repetition rates (s-1) = 27; pulse width = 0.5 ms; peak intensity = 2290 W/m2; average intensity = 32 W/m2; noise levels = 70-90 dB + ear stopples
701	threshold values; pulse repetition rates (s-1) = 27; pulse width = 1.0 ms; peak intensity = 2540 W/m2; average intensity = 71 W/m2; noise levels = 70-90 dB + ear stopples
702	threshold values; pulse repetition rates (s-1) = 400; pulse width = 0.0025 ms; peak intensity = 250000 W/m2; average intensity = 250 W/m2; noise levels = 70-90 dB + ear stopples
703	threshold values; pulse repetition rates (s-1) = 224; pulse width = 0.006 ms; peak intensity = 2670 W/m2; average intensity = 4 W/m2; noise levels = 70-80 dB + ear plugs

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
704	threshold values; pulse repetition rates (s-1) = 400; pulse width = 0.001 ms; peak intensity = 50000 W/m2; average intensity = 20 W/m2; noise levels = 70-80 dB + ear plugs
705	threshold values; pulse repetition rates (s-1) = 3; pulse width = 0.001-0.032 ms; peak intensity = 12500-400000 W/m2; average intensity = 1 W/m2; energy pulse = 0.4 J/m2; noise levels = 45 dB
706	polytonal sound; pulse repetition rates (s-1) = 1000-1200; pulse width = 0.01-0.03 ms; peak intensity > 5000 W/m2; noise levels = 40 dB + ear stopples
707	pulse repetition rates (s-1) = 0.5; pulse width = 0.005 ms; peak intensity = 22000, 28000 W/m2; incident energy density per pulse = 0.11, 0.14 J/m2
708	pulse repetition rates (s-1) = 0.5; pulse width = 0.01 ms; peak intensity = 13000 W/m2; incident energy density per pulse = 0.13 J/m2
709	pulse repetition rates (s-1) = 0.5; pulse width = 0.015 ms; peak intensity = 5800 W/m2; incident energy density per pulse = 0.087 J/m2
710	pulse repetition rates (s-1) = 100; pulse width = 0.001-0.01 ms; peak absorbed energy density per pulse = 0.02 J/kg
711	pulse repetition rates (s-1) = 30; pulse width = 0.01-0.5 ms; pulse intensity = 620-1560 W/m2; average intensity = 0.5-14 W/m2; incident energy density per pulse = 0.0156-0.468 J/m2; peak absorbed energy density per pulse = 0.006-0.18 J/kg
712	pulse repetition rates (s-1) = 1; pulse width = 0.003-0.032 ms; pulse intensity = 8000-58000 W/m2; average intensity = 0.17-0.28 W/m2; incident energy density per pulse = 0.174-0.283 J/m2; peak absorbed energy density per pulse = 0.0123-0.02 J/kg
713	pulse repetition rates (s-1) = 1; pulse width = 0.0005-0.032 ms; pulse intensity = 6000-356000 W/m2; average intensity = 0.15-0.47 W/m2; incident energy density per pulse = 0.152-0.47 J/m2; peak absorbed energy density per pulse = 0.0087-0.0267 J/kg
714	pulse repetition rates (s-1) = 1; pulse width = 0.032 ms; pulse intensity = 148000-388000 W/m2; average intensity = 4.72-12.4 W/m2; incident energy density per pulse = 4.72-12.4 J/m2
715	pulse repetition rates (s-1) < 10; pulse width = 0.025-0.25 ms; average intensity < 100 W/m2; peak absorbed energy density per pulse = 0.004-0.04 J/kg
726	modulation = 6-20 Hz; intensity = 10-20 W/m2
727	modulation = 16 Hz
728	modulation = 16 Hz
729	modulation = 9, 16 Hz
730	modulation = 16 Hz
731	modulation = 16 Hz
732	modulation = 16 Hz
733	modulation = 16 Hz
734	modulation = 16, 32 Hz
735	modulation = 16, 32 Hz

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
736	modulation = 16 Hz
737	modulation = 16 Hz
738	modulation = 8, 16, 32 Hz
739	modulation = 16 Hz
740	modulation = 16 Hz
741	modulation = 8, 16, 32 Hz
742	modulation = 8, 16, 32 Hz
743	modulation = 16 Hz
744	modulation = 3, 16 Hz
745	modulation = 3, 16 Hz
746	modulation = 16-100 Hz
747	modulation = 16 Hz
748	frequency: 2.56-4.1 GHz
749	frequency: 0.6-9.5 GHz
750	frequency: 0.02-5 GHz; intensity: ~10 W/m2 (routine)
751	frequency: 0.02-5 GHz; intensity: 1000 W/m2 (occasional)
752	this was also report in table14 of source #1 with no effect
755	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
756	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
757	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
758	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
759	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
760	duration: 0-13 years, average was 6.5 years, the duration was computed base on working 8 hours a day and 250 working days per year

REMARKS OF DATA BASE OF RADIOFREQUENCY BIOLOGICAL EFFECTS

ID	REMARKS
761	power source was radar; duration: 1-10 years, average was 5.5 years, the duration was computed base on working 8 hours a day and 250 working days per year; one group consisted of 507 men exposed to mean power density greater than 0.2 mW/cm2, with short-term exposures estimated to reach 6.0 mW/cm2. the other group was 334 men exposed to mean power density levels less than 0.2 mW/cm2.
762	power source was radar; duration: 1-10 years, average was 5.5 years, the duration was computed base on working 8 hours a day and 250 working days per year; one group consisted of 507 men exposed to mean power density greater than 0.2 mW/cm2, with short-term exposures estimated to reach 6.0 mW/cm2. the other group was 334 men exposed to mean power density levels less than 0.2 mW/cm2.
763	power source was radar; duration: 1-10 years, average was 5.5 years, the duration was computed base on working 8 hours a day and 250 working days per year; one group consisted of 507 men exposed to mean power density greater than 0.2 mW/cm2, with short-term exposures estimated to reach 6.0 mW/cm2. the other group was 334 men exposed to mean power density levels less than 0.2 mW/cm2.
764	power source was radar; duration: 5-10 years, average was 7.5 years, the duration was computed base on working 8 hours a day and 250 working days per year; the control group consisted of 220 persons; the power density: ~1.0-5.0 mW/cm2
765	frequency: 2.56-4.1 GHz, intensity: 0.005 mW/cm2 maximum, SAR; 0.0002 W/kg maximum; duration: 22 years, the duration was computed base on working 8 hours a day and 250 working days per year
766	frequency: 0.2-5.0 GHz, intensity: 0.018 mW/cm2 maximum, SAR; 0.0007 W/kg maximum; duration: 0.5 years, the duration was computed base on working 8 hours a day and 250 working days per year
767	frequency: 0.2-5.0 GHz, intensity: ~`1.0 mW/cm2 (routine), 100 mW/cm2 (occasional), SAR; less than 0.05 W/kg (routine), less than 5.0 W/kg (occassional); duration: 2.0 years, the duration was computed base on working 8 hours a day and 250 working days per year; over 40,000 veterans were inclued in the study
768	frequency: 3.6-10.0 GHz, intensity: 0.01-0.1 mW/cm2, SAR; 0.003-0.004 W/kg; duration: 1-17 years, average: 8 years, the duration was computed base on working 8 hours a day and 250 working days per year